

AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
Civilian and Defense

DECEMBER 15, 1951

In This Issue . . .

New Type Aluminum Cylinder Heads

Modern Leaf Spring Design

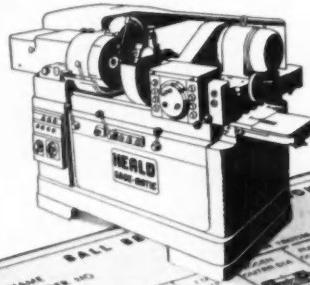
Valving Changes in Hydro-Matic

De Soto V-8 Engine Plant

Part II of Power Steering Series

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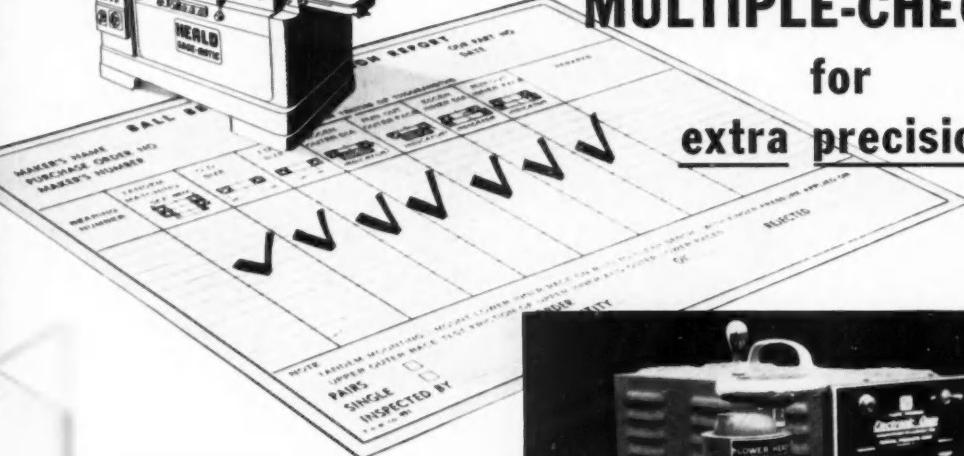
A CHILTON PUBLICATION



every ball and roller bearing

MULTIPLE-CHECKED

for
extra precision



...another reason why
Heald machines have an
important bearing on
your precision production

The ball and roller bearings used in Heald equipment are specially manufactured to the most exacting specifications. Yet even that is not enough. Before use, the inner and outer races of each bearing are rigidly checked for tandem machining, O.D. size, I.D. size, O.D. eccentricity, I.D. eccentricity, runout of inner and outer bearing faces.

This extra care and precision in bearing selection is typical of the way every Heald precision finishing machine is built — from base to bridge. It's not the easiest way to build a machine. But it's certainly the best. For it all adds up to more and better production of YOUR precision finished parts.



*Heald machines speed
the nation's production*



Precision measuring set-up for checking O.D. size to millionths of an inch on anti-friction bearings prior to assembly into Heald Red Head Boringheads and Wheelheads.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York



The home-town folks are not easily impressed. They know you and your product, too. Save your sales talk—they pay off on performance.

This comes to you direct—from the home of Waukesha Engines. And it's Mr. W. E. Dick, City Engineer, talking—"The City of Waukesha, Department of Public Works, now has twelve pieces of engine-driven machinery . . . powered with your engines. Among the most satisfactory units we own is the Hough *Payloader* which we have had in constant use . . . the lively acceleration and quick pickup of your power plant in this machine, and the speed and flexibility of itself in maneuver, is beyond description. We could never have handled so quickly, and with so little

interruption to traffic, the heavy snows, sleet and ice that clogged gutters and crossings without this valuable and dependable loader. Any bulk material loading job is easily and quickly handled by this versatile rig . . . also very useful in grading. This Hough *Payloader* with Waukesha power can't be beat."

Payloaders—tractor-shovels that dig, load and carry-all types of material—are made by The Frank G. Hough Co., Libertyville, Ill., who power them with Waukesha Engines. Mr. Dick can tell you why. He has "been using your (Waukesha) power plants for years with complete satisfaction. The durability built into your product leaves nothing to be desired." Send for Bulletin 1411.

WAUKESHA Diesel POWER

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • NEW YORK, TULSA, LOS ANGELES

INCONEL "X"

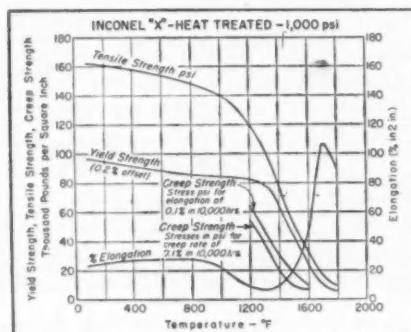
An oxidation-resistant alloy with very high strength over 1000°F

Inconel "X"® is an age-hardenable alloy which is unusually strong both at ordinary temperatures and at red heat. Suitably heat-treated, Inconel "X" has low creep rate under high stresses over 1000°F—and exceptionally high spring properties up to 1100°F.

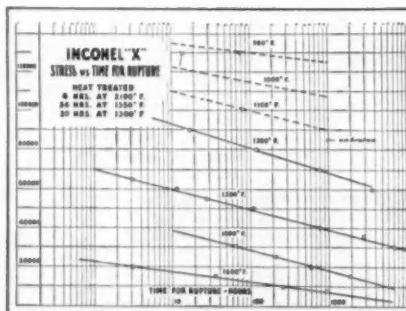
The principal engineering characteristics of Inconel "X" (besides those shown on accompanying charts) are:

- **Oxidation Resistance**—Tests indicate that oxidation resistance of Inconel "X" is of the same order as that of Inconel.

- **Fatigue Strength**—Measurements of fully heat-treated Inconel "X" on rotating beam machines, at 100,000,000 cycles, show fatigue strengths ranging from 55,000 psi at 1200°F to 36,000 psi at 1500°F.



Short-time high-temperature properties of fully heat-treated Inconel "X".



High-temperature stress-to-rupture properties of fully heat-treated Inconel "X".

- **Impact Strength**—For fully heat-treated Inconel "X", typical impact strength values are: 33 ft. lbs. at -320°F, 37 ft. lbs. at room temperature, 67 ft. lbs. at 1500°F, and 113 ft. lbs. at 1600°F.

- **Hardness**—By proper heat treatment, the room temperature hardness of Inconel "X" can be developed as desired from BHN 140 to BHN 400.

- **Spring Properties**—By a combination of heat treatment and cold working, Inconel "X" develops unusually high spring properties. For spring applications from sub-zero temperatures up to about 650°F, it is useful where otherwise unusually strong ferrous springs must be used. Up to 1100°F, Inconel "X" springs will give useful performance where few other metals can be relied on.

- **Machining**—Inconel "X" is machinable in all conditions. Because of its strength and toughness, it cannot be machined as easily as softer metals; it can, however, be machined at entirely satisfactory rates.

- **Forging**—No unusual difficulties are encountered in forging Inconel "X", though heavier equipment than that used on ordinary steels is required.

- **Welding**—Inconel "X" can be welded by nearly all commonly used methods including: metal arc, inert gas metal arc, atomic hydrogen arc, resistance spot and seam, resistance butt welding. In common with other age-hardenable alloys, proper controls must be exercised over welding procedures. It is suggested that Inco's Technical Service section be contacted for recommendations on special jobs.

- **Applications**—Inconel "X" is used in gas turbine rotor wheels, blades; heavily stressed bolts; expansion bellows; valve springs in resonant jet engines . . . wherever a combination of high stress and extreme heat must be met.

- **Forms Produced**—Inconel "X" is supplied in most commonly used mill forms—billets, rod, flats, rounds, hexagons, sheet, strip, bar, wire, seamless tubes, and welding rods.

FURTHER DATA AVAILABLE

Inconel "X" is now in urgent requirement for critical defense applications, and we cannot say now just how soon we will be able to supply it for normal uses again. But you can get detailed information about Inconel "X" in your return mail by writing for our 79-page reference manual "Inconel 'X'" Data and Information.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.



MONEL® • "R"® MONEL • "X"® MONEL • "KR"® MONEL • "S"® MONEL
NICKEL • LOW CARBON NICKEL • DURANICKEL®
INCONEL® • INCONEL "X"®

AUTOMOTIVE INDUSTRIES

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December 15, 1951

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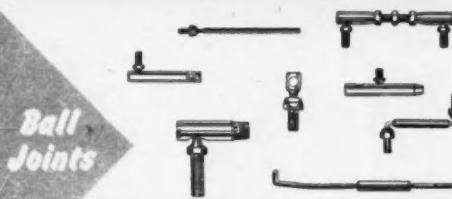
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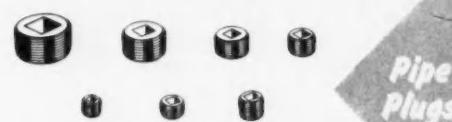
AUTOMOTIVE INDUSTRIES, December 15, 1951

TOUREK

BALL JOINTS, PIPE PLUGS
AND QUALITY
SCREW MACHINE PRODUCTS



• The use of Tourek Ball Joints—the only recognized standard—frequently brings about simplified design, improved performance and lower costs. A wide range of standard types is carried in stock to assure prompt delivery.



• Accuracy, high strength and economy are yours by specifying Tourek precision countersunk pipe plugs. You get these advantages at costs which are competitive to old style plugs. Stock sizes, available with National Pipe or Dry-Seal threads are: $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ " and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to $2\frac{1}{2}$ " diameter.



• The Tourek plant is one of the largest and most modern in this field. It is equipped with the latest in high speed single and 6-spindle automatics, as well as complete secondary equipment including grinding and brazing. These production facilities—backed by 30 years' experience, assure you "The Best In Quality Screw Machine Products."

Depend upon Tourek for your screw machine product needs, in sizes up to $2\frac{1}{2}$ ".

LITERATURE. Comprehensive data on any or all Tourek products sent promptly upon request... write for yours now. J. J. TOUREK MFG. CO., 4701 W. 16th St., Chicago 50, Illinois

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TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"



ESTABLISHED IN 1920



PANGBORN ROTOBLAST*

CABINET CLEANS UP TO 200 ENGINE BLOCKS AN HOUR

at world's largest independent jobbing foundry

ROTOBLAST . . .

SAVES LABOR with push-button operation

SAVES SPACE because machines are compact

SAVES TIME by cleaning more loads per day

SAVES POWER since no compressor is needed

SAVES TOOLS because all scale is removed

BLAST CLEANING at Campbell, Wyant, Cannon Foundry Co., of Muskegon, Mich., is fast, efficient and mechanized! And the secret of this performance is two Pangborn "ES" ROTOBLAST Cabinets like that shown above. Heavy engine blocks can be cleaned at a rate of 200 *an hour* . . . and cleaning is automatic!

The result is faster, better, cheaper blast cleaning than ever experienced with other equipment.

Campbell, Wyant, Cannon started to mechanize their cleaning operation in

ABOVE: This rear view of Campbell, Wyant, Cannon's Pangborn "ES" ROTOBLAST Cabinet shows the conveyor system and four ROTOBLAST Machines. Inside the cabinet, the conveyor stops in front of each ROTOBLAST unit and slowly revolves the casting in the blast stream for complete cleaning.

1937 . . . when they installed one of the first Pangborn monorail ROTOBLAST Cabinets. Later they installed a second Cabinet to meet production demands. As a result cleaning costs have been even further reduced, and there's no cleaning room bottleneck. Cleaning is a simple, automatic operation with high-quality work assured.

GET THE COMPLETE ROTOBLAST STORY: Bulletin 214 is informative and covers many applications. Write for your free copy to: Pangborn Corporation, 3900 Pangborn Blvd., Hagerstown, Md.



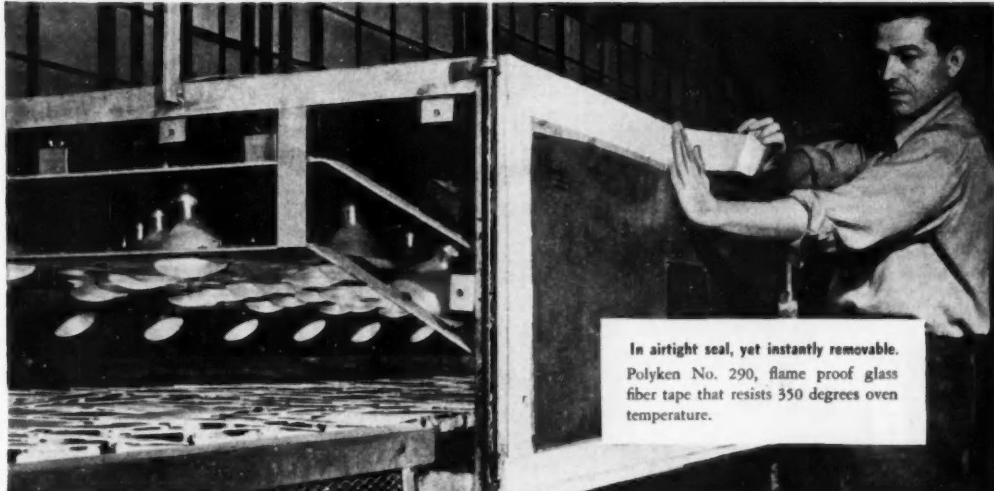
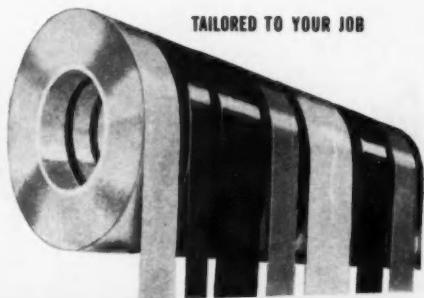
*TRADEMARK
OF PANGBORN
CORPORATION

Pangborn

**BLAST CLEANS CHEAPER
with the right equipment for every job**

THE NEW
Polyken®
INDUSTRIAL TAPES

TAILORED TO YOUR JOB



In airtight seal, yet instantly removable.
Polyken No. 290, flame proof glass fiber tape that resists 350 degrees oven temperature.

New tape holds fast on superheated surfaces

The problem was to seal scorching-hot surfaces airtight in such a way that they could be unsealed again at a moment's notice.

Ohio Can and Crown Co. had one delicate operation that was a major problem—the drying oven, where surface temperatures reached as high as 350 degrees. Crevices and other openings in the oven allowed dirt to filter through onto the conveyor line where the freshly enameled tiles were moving. And since the oven had to be disassembled occasionally for thorough cleaning, it was impractical to caulk or weld these openings.

A Polyken Sales Engineer, after testing, suggested Polyken Tape No. 290 for an efficient, timesaving seal. This tape has a flame-resistant adhesive, with a backing of woven glass fiber that is as flame-proof as glass itself.

No. 290 is only one of more than 100 Polyken tapes, including the tape to solve *your* problem. Send in today for free samples and booklet!

FREE

**Polyken, Dept. AIM, 222 West Adams St.,
Chicago 6, Ill.**

For specifications, samples, and further information on this and other Polyken tapes, please send me your **FREE BOOKLET**, "Tape is a Tool."

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Company _____

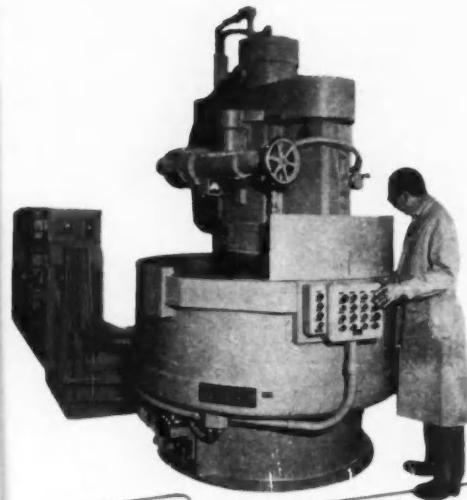
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Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company

One Grinder— Twice the Output

**multi-station fixturing
doubles piece output in
sequence operations**



CASE ONE

No. 710-18"-30 hp Besly-Bowen Radial Head Face Grinder with automatic cycle control. Used by automotive manufacturer to grind mating surfaces of cast iron chain case covers. $1/16"$ stock removed from rough casting. Production rate: 90 surfaces per hour. Accuracy: flat within .002" with approximately 30 micro-inch finish. Fixtures: hand-operated, cam-clamping. Grinder is equipped with two 22" diameter variable speed rotary tables and automatic cycle control. Single cycle cam in feed gives rapid approach, controlled speed and a dwell or spark-out period.

AVAILABLE IN A FULL RANGE OF SIZES

BESLY

TAPS—the world's
most accurate tap.

TWIST DRILLS AND
REAMERS—Complete
line for every need.

BESLY-TITAN
ABRASIVE WHEELS
AND DISCS—
individually formula-
ted for your job.

GRINDERS that re-
duce costs on every
type of surface
grinding.

CHARLES H. BESLY & COMPANY • 118 N. Clinton Street • Chicago 6, Illinois • Factory: Beloit, Wisconsin

the new
BESLY-BOWEN
RADIAL HEAD FACE
GRINDER

Achieves Time-Saving, Continuous Operation

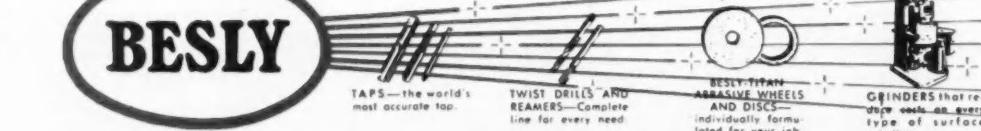
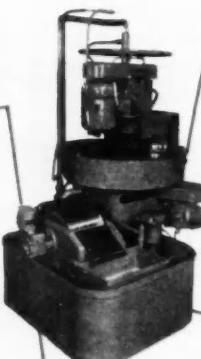
Totally different in basic design, Besly-Bowen Grinders offer distinct advantages for fast, accurate, low-cost mass production. No time is lost by machine waiting for operator to unload and reload fixtures . . . or by the operator waiting for completion of operating cycle. Loads at one station while grinding takes place at another.

Balanced assembly head and a single, massive, slow-moving bearing provides four-way compound movement. Micrometer adjustment with direct reading—free from backlash—maintains close tolerance indefinitely. Other important features: ample coolant flow without splash or spray, hand-operated or fully-automatic operation, ideal loading height (variable) and small floor space.

Write for full details.

CASE TWO

No. 705-8"-5 hp Besly-Bowen Radial Head Face Grinder for finishing cast iron water pump impellers. Produces 150 parts an hour—removing $1/32"$ of stock from 6 fins at 15° angle in a single pass of approximately 15 to 20 seconds duration. Head swings clear of the fixture and stops. A limit switch contacted by grinding head, automatically stops the work spindle rotation.



HYATT HY-LOADS

*Your best
bearing bets—*

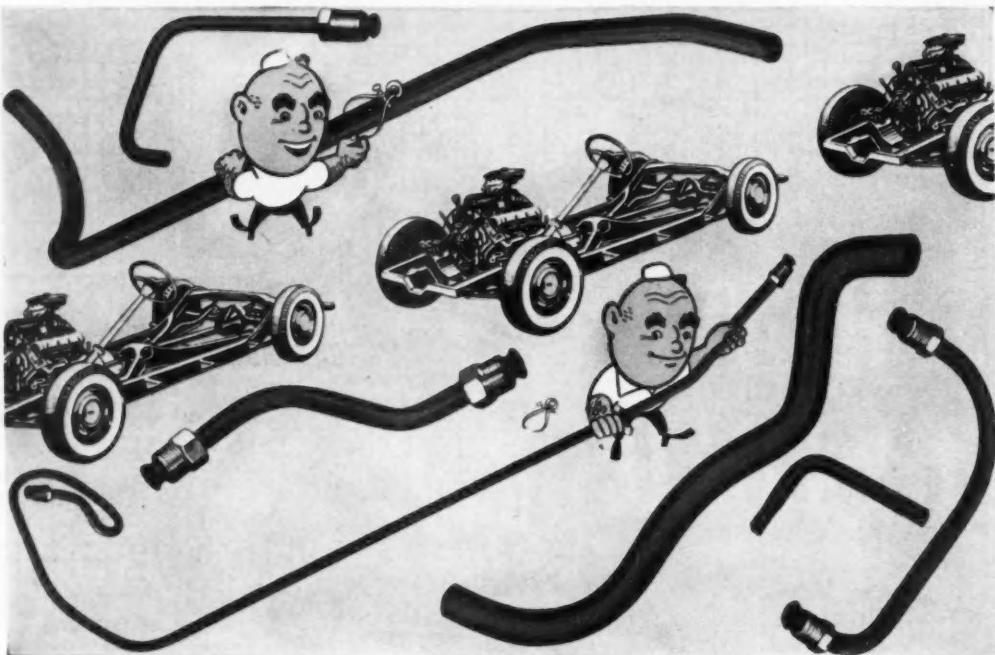
THE Hyatt Hy-Load[®] line of cylindrical roller bearings, for radial loads or light or intermittent thrust loads, are made in two diameter series, wide and narrow widths, and to standard boundary dimensions.

There are ten different types of Hyatt Hy-Load Roller Bearings. Four have separable inner races, two have separable outer races, and four are non-separable. There is

also the duplex, or double-row type of Hyatt Hy-Load with a separable inner race.

Along with the Hyatt Hy-Load Roller Bearings and their wide flexibility in design and assembly proceedings, there are other types of Hyatts with equally desirable advantages for car, truck and bus applications. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J. and Detroit, Mich.

HYATT ROLLER BEARINGS



Better lines for your production line with Bundyweld Tubing!

BETTER for smoother production, for finer performance in your cars.

Your automotive tubing units, fabricated at Bundy, are formed exactly to specification, checked and double checked by our crews, then shipped direct, on time and right, to your assembly lines. If you prefer, Bundy-

weld® Tubing is available in straight lengths for smooth, fast fabrication in your plant.

Either way, Bundyweld helps reduce rejects, avoid production delays, lower costs for you. It's extra strong, yet ductile, too. It bends more readily and takes more bending with no danger

of structural collapse or weakening. And do those Bundyweld lines hold up! Leakproof, rugged double-walled Bundyweld takes jolts, jars, and stresses, for the life of your car, truck, or bus—in fuel lines, oil lines, hydraulic brake line systems.

Just double check Bundyweld's twenty-year reputation as the preferred tubing wherever motor-powered vehicles roll on wheels. Then, for the full story of amazing Bundyweld, write:

Bundy Tubing Company, Detroit 14, Mich.

Bundyweld Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Bonding metal fuses with basic metal, presto—



Bundyweld . . . double-walled and brazed through 360° at wall contact.



SIZES UP
TO $\frac{5}{8}$ " O.D.

NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

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*My trip's a breeze, again this year...
Cause my sleigh is steered
by a good ROSS GEAR!*

Merry Christmas

*At Christmas time we realize more than ever
how much it means to have the friendship and
goodwill of folks like you . . .*

*In warm sincerity we extend to you and yours
our thanks and best wishes for a very Merry
Christmas and a Happy New Year.*

Ross

Cam & Lever STEERING

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

AUTOMOTIVE INDUSTRIES, December 15, 1951

on land, sea and in the air

Acadia Synthetic Rubber Products are once again in great demand for the nation's defense. They are serving in a large variety of important purposes in weapons and equipment on land, sea and in the air. Manufacturers in hundreds of industries have learned they can always depend upon the uniformly high quality of Acadia Synthetic Rubbers.

They are readily compounded to exact degrees of elasticity, resilience, plasticity; offer high resistance to oil, age, light, temperature extremes. They can be molded or extruded—cut to close tolerances in endless shapes and sizes.



sheets • tubing • strips
• channel • washers •
seals • bellows •
gaskets • rings •
extrusions • cut parts



ACADIA

Processors of Synthetic Rubber
and Plastics • Sheets •
Extrusions • Molded Parts

Synthetic
PRODUCTS

DIVISION WESTERN FELT WORKS

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...because they're

custom-built to fit the job



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industrial locomotives



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pumps, generator sets



Buses and
on-highway trucks



Earthmovers, logging
yarders and loaders



Off-highway trucks,
crawlers tractors



Work boats,
pleasure craft

Lightweight, high-speed Diesels (50-550 hp) for these and many other uses

...because they're

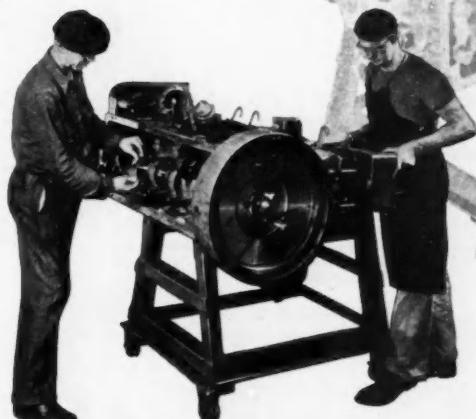
**BUILT
NOT
ONCE
BUT
TWICE**

Rugged, lightweight, high-speed Cummins Diesels are at work everywhere. Each engine is built *twice*. It's assembled, run-in tested, disassembled and inspected, then reassembled and tested again. This extra care in building, plus Cummins exclusive fuel system and an efficient and expanding service and parts organization, means minimum "down time", more power and profits for the user. See your Cummins dealer.



TRADEMARK REG. U. S. PAT. OFF.

**Diesel power by
CUMMINS**

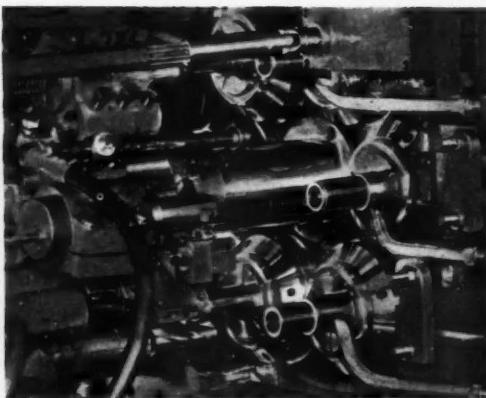
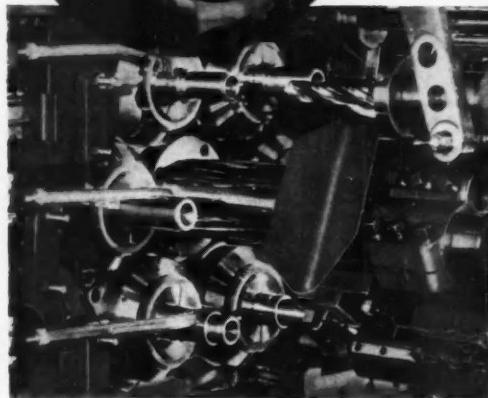


CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: Cummins Diesel Export Corporation • Columbus, Indiana, U.S.A. • Cable: Cundies



NO NEED TO "SETTLE" FOR LESS



FRONT AND REAR SIDES OF 2 1/2-SIX

Multiple Spindle Bar Automatics produce more work per square foot of floor space than do other types of metal cutting machine tools. But, when *one* spindle is "down" *all* are "down." It's why dependability will always be the outstanding requirement of the "Automatic."

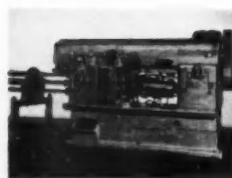
So many factors are involved in dependability that any weakness in design, engineering, material, or construction, will eventually contribute to higher costs of operation and maintenance.

Part of any new machine's service to the prospective user is the availability of *full* information. No prospective purchaser need "settle" for less. At least it's that way with CONOMATICS.

In producing the piece shown, on a 2 1/2-SIX, the eccentric forming attachment (see upper right illustration) combines the well known CONOMATIC facilities of form tool support and "all position" attachment spindle drive.



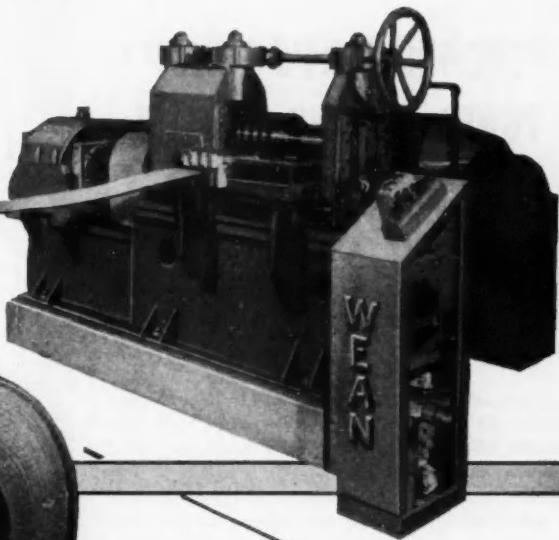
A Comparison of ALL Automatics is in favor of Cone



Conomatic}

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Wean offers you



GENERAL DUTY SLITTING LINES

WITH SPEEDS UP TO 800 FPM

AT LOW INITIAL COSTS

PLUS FEATURES THAT ENABLE YOU TO

- 1. Reduce Inventories
- 2. Cut Labor Costs
- 3. Eliminate Extras
- 4. Minimize Maintenance Costs

If you are in the business of handling strip steel or fabricating steel parts or products from strip steel you should give your slitting operation high consideration. Well designed slitting lines enable you to reduce inventories, lower labor costs and eliminate extras. Wean engineered slitting lines give you these important factors at lowest initial costs.

If you have a slitting problem — or merely desire a check on the efficiency of your present operation — call in Wean specialists.

Wean

Equipment Corporation
CLEVELAND, OHIO

THE INDUSTRY'S FINEST POWER BRAKING SYSTEMS

*on Highways
Everywhere!*

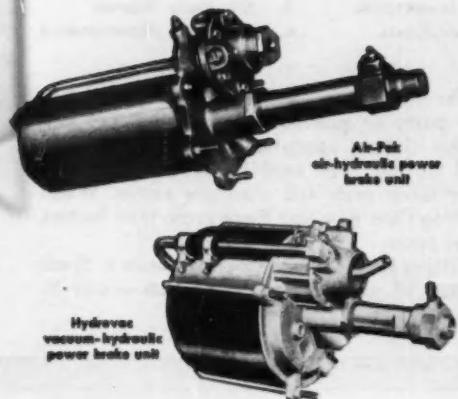
Regardless of the size of vehicle or whether the preference is for vacuum or air, the trucking industry has come to look to Bendix Products as the one source uniquely qualified to meet every power braking need.

Hydrovac, the world's most widely used power brake, is the undisputed leader in the vacuum-hydraulic field. And Air-Pak is recognized as foremost in the field of air-hydraulic power braking units.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a constant safety factor of tremendous importance.

That's why on highways everywhere the preference is for Bendix Hydrovac* or Bendix Air-Pak, the Industry's Finest Power Braking Systems.

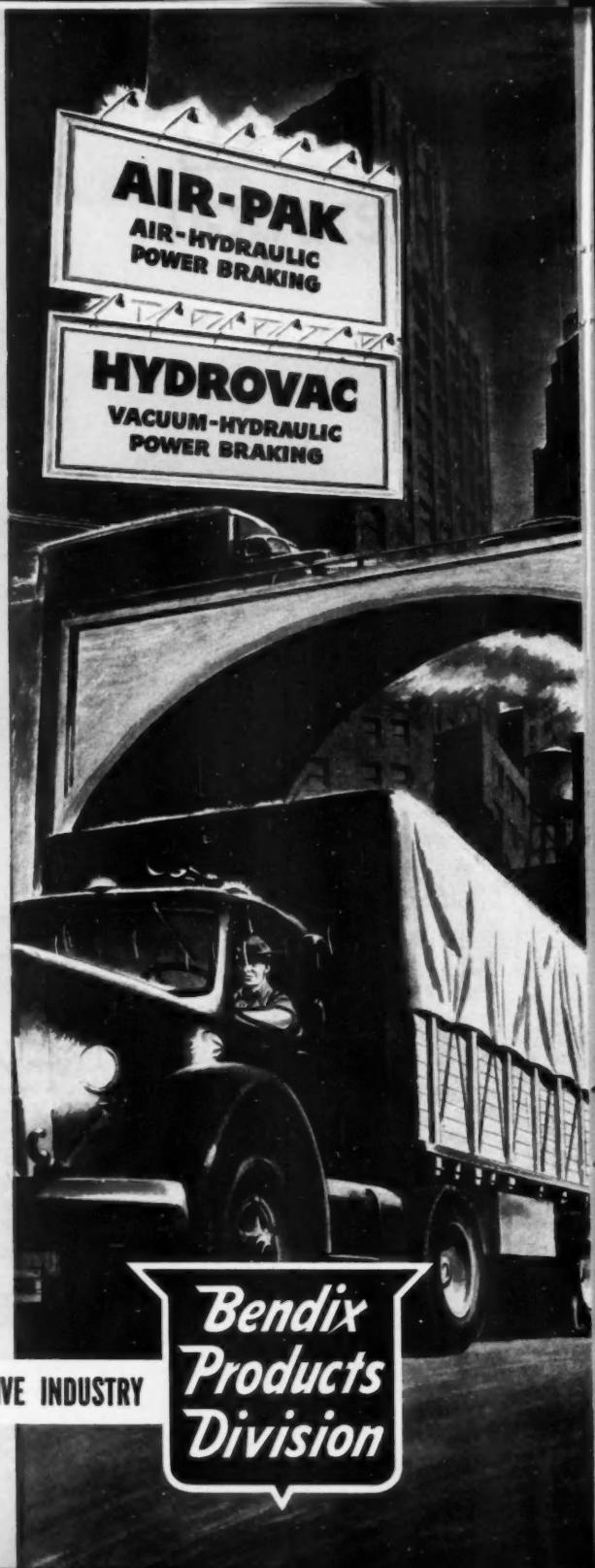
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AUTOMOTIVE INDUSTRIES

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High Spots of This Issue

Aluminum Cylinder Heads Formed by New Method

Here is described a new method of making aluminum cylinder heads and similar parts difficult to economically produce by conventional casting methods. A development of the Aluminum Co. of America, its details begin on page 34.

Dual-Range Hydra-Matic Transmission

Pontiac Motor Div., GMC, has released detailed information on the changes made in the Hydra-Matic transmission, in connection with its 1952 models. This conversion to dual-range has required a new front pump, changes in control valving, and redesign of front and rear servo units. See page 36.

Modern Leaf Spring Design

The knowledge of exact operating stresses and stress patterns point the direction to follow in engineering a well-designed spring. Valuable information, supplemented by test charts, are offered by the author of this article. Page 38.

De Soto's V-8 Engine Production

De Soto's brand new production setup situated in an old plant modernized to the limit makes this account of the V-8 engine of decided interest. See page 42.

Power Steering for Modern Vehicles

This second part of a two-part article describes and illustrates the principles and operation of the various types of power-assisted steering gears. Turn to page 50.

23 New Products Items

And Other High Spots, Such As:

Chrysler's larger six-cylinder engine for 1952; Chrysler's new tank plant; faster handling of palletized parts; Metlbond process for joining metal with adhesives; a new gage for flying box cars; antiques to hot rods at second annual Motorama; news of the machinery industries; the Business Pulse; and new Defense facilities and contract awards.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3

AUTOMOTIVE INDUSTRIES COVERS

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES
• BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY •
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT
SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

To Management:

We suggest you bring this page to the attention of your Purchasing, Production and Maintenance Depts. One or more of its paragraphs may lead to the solution of critical procurement problems in your plant.

Stymied by Steel Shortages?

These 6 Suggestions May Help!

(1) Handicapped by restrictions on nickel-bearing 18-8 stainless? If you are, straight chrome stainless may enable you to continue your stainless production. For instance, type 430—the most widely used straight chrome steel—can often be substituted for type 302 in applications subject to mild corrosion. Ryerson offers you the largest and most diversified stocks of straight chrome stainless including types 405 and 430 sheets, type 430 plates and type 416 bars.

(2) Manufacturers plagued by seamless tubing scarcities will find that bright-finish, hot rolled welded tubes in 11 gauge and $\frac{3}{16}$ " walls can often be used as an alternate for seamless tubes in the same sizes. These welded tubes are in good supply at Ryerson in a wide range of round and square sizes.

(3) If you are having trouble adopting interim and lean alloys because of the unfamiliar analyses of these new steels, let Ryerson metallurgists work with you. We test all alloys and can assure the hardenability desired. Heat treatment guide with every shipment.

(4) Faced with the problem of finding workable substitutes for special plate shapes? You may find the right answer in forgings. You can get complete information on forgings from our sales representative.

(5) In addition to these alternate steels we recommend a superior babbitt—Glyco Babbitt Metal—instead of more expensive and restricted high tin babbitt. Product of an exclusive Ryerson formula, Glyco is a lead base alloy with physicals equal to tin base types.

(6) And, remember—please give us full information when ordering. For instance, when we know the exact size or length multiple—the cut size or length you will actually use—we may be able to fill your order from smaller pieces or "shorts." Knowledge of acceptable alternates also helps. But, no matter what your requirements, we urge you to check with us. We will always work closely with you—help you get what you need.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

News of the AUTOMOTIVE INDUSTRIES

Vol. 105, No. 12

December 15, 1951

Hudson to Enter Light Car Field

Another independent automobile company will introduce a brand new light car next year. Hudson Motor Car Co., which has had such a vehicle under development for several years, is reported to be going ahead with its plans for producing a light car some time next summer using existing factory facilities. Details of the projected car have not been made available but, in general terms, it will be much lighter and smaller than any now being produced by Hudson and will be priced several hundred dollars below the Pacemaker, the company's cheapest current model. The car will embody the step-down design and integral body-frame construction, which Hudson states will permit better roadability, handling, and performance than has ever been available before in a light car.

It is expected that the new car will be built on a separate line from the regular models with new body dies used. A. E. Barrett, Hudson president, has said nothing about dies for the new model, but it was reported more than a year ago that Hudson had such dies completed. The car is specifically designed to compete in the Ford-Chevrolet-Plymouth price field.

Willys Calif. Plant Toolled for Production of New Car

Willys-Overland Motors, Inc., is retooling at its Maywood, Calif., plant for production of the new six-passenger sedan. It is reported that employment, presently about 300 persons, will increase 50 per cent when peak production is reached.

Ford "Six" Engine Reported to Include Novel Features

Integral valve guides for lower valve temperatures, a four-main-bearing crankshaft, with provision made for future use of seven main bearings, and valve rotators of ingenious design are among the special features of the new Ford overhead-valve, six-cylinder engine. This information was disclosed by E. S. MacPherson, chief engineer, Ford Motor Co., at a meeting of the Society of Automotive Engineers held in Chicago, Ill., Dec. 13.



PRESENTING THE NEW WILLYS

The new Willys-Overland Aero Wing six-passenger car features a six-cylinder, 90-hp F-head engine that is said to deliver up to 35 miles to the gallon at a speed of 30 mph using overdrive and regular gasoline. The car has a wheelbase of 108 in. and an overall length of 180 1/2 in. Factory wholesale prices ranging from \$1310.25 to \$1468 have been approved by the Office of Price Stabilization. A complete description of mechanical and design features will appear in the Jan. 1 issue of AUTOMOTIVE INDUSTRIES. The sedan is the first passenger car that Willys has built since 1942, when it undertook all-out production of its famed "Jeep" for the armed forces. It is, therefore, alleged to be the result of extensive design and engineering research.

The new engine has a deep crankcase structure that provides a stiffer support for the crankshaft and extrrigid engine mounting at the rear, and permits use of a shallow oil pan with a flat sealing surface. According to Mr. MacPherson, more power is developed with less piston displacement. The high compression ratio combustion chamber is designed to operate on regular grade gasolines.

OPS Authorizes Increases in Car Price Ceilings

Automobile ceiling price increases were provided for in two recent orders issued by the Office of Price Stabilization. One authorizes manufacturers to apply for price ceiling boosts in accordance with the Capehart formula of the economic controls law. This allows manufacturers to ask for price ceilings based on their pre-Korean prices, plus cost increases up to July 26, 1951. The other order allows car manufacturers to adjust their price ceilings to reflect higher costs resulting from the use of conversion steel.

Austin and Nuffield Reveal Merger Plans

Austin Motor Co., Ltd., and Nuffield Exports, Ltd., Britain's two largest automobile manufacturers, recently announced plans to merge. It is stated that the amalgamation will result in more efficient and economic production, a stronger export drive, and benefits to manufacturing and assembly abroad.

Under the terms of the merger, a holding company will be formed with an authorized capital of five million pounds sterling, divided into 20 million ordinary shares at five shillings each. Subject to government consent, the holding company will make an offer to the ordinary share and stock holders of the two manufacturing companies to exchange their existing five shilling ordinary stock units and shares for an equivalent number of five-shilling ordinary shares in the holding company.

The merger will bring under one control all the passenger cars, trucks, and tractors manufactured by Austin, Morris trucks, passenger cars, tractors, and marine engines, Wolseley, M.G., and

News of the AUTOMOTIVE



MULTIPLE-USE ATTACK PLANE

The new Douglas AD-5 Skyraider "Multiples" bomber can readily be converted into a dozen different combat varieties (passenger transport, photographic plane, radar uses, etc.) through a packaged conversion kit. It is powered by a single Wright R-3350 26W engine.

Riley passenger cars, and S.U. carburetors. The first directors will be: Viscount Nuffield (Morris), chairman; L. P. Lord (Austin), deputy chairman and managing director; R. F. Hanks (Morris), vice chairman; and G. W. Harriman (Austin), deputy managing director.

British Unveil Delta-Jet Gloster GA-5 Fighter

Britain recently took the wraps off her first operational Delta aircraft, the Gloster GA5 of the Hawker Siddeley Group, Ltd. Powered by Armstrong Siddeley Sapphires, the plane is an all-weather, day-and-night, long-range fighter. Speed, range, armament, and radar gear are still classified. However, a Gloster Meteor, similarly powered by twin Sapphires with a 7000-lb thrust, recently broke four world speed-to-altitude records by climbing 39,370 ft in three minutes, seven seconds.

According to British authorities, the low aspect of the Delta wing provides minimum change in stability and control characteristics at sonic speeds. The planform is said to permit engines, undercarriage, fuel, and equipment to be incorporated into one smooth envelope, while the shape permits a rigid and economical construction. Finally, it is claimed that the air frame design itself is the corollary to the power demands of twin Sapphires.

Italian Drivers Triumph in Pan-American Contest

Two veteran Italian drivers emerged as first and second place winners in the recent 1933-mile, five-day Pan American stock-car race, sponsored by Mexico's National Automobile Association. Piero Taruffi, who finished fourth last year, came in first driving a Ferrari at an average speed of 87.6 mph for 21 hours, 57 minutes, and 52 seconds. This feat captured for him the

first prize of \$23,180 out of a total of \$63,380 in cash awards.

Close on Taruffi's heels came his countryman, Alberto Ascari, also driving a Ferrari, in 22:05:56. Third was Bill Sterling of El Paso, Tex., who crossed the finish line in a Chrysler with a recorded time of 22:13:46. Other contestants in the first ten places were: Troy Ruttman, Glenwood, Calif.; Mercury, 22:18:03; Jean Trevoux, Paris, France; Packard, 22:22:17; Marshall Teague, Daytona Beach, Fla.; Hudson, 22:41:40; A. C. Rogers, Colorado Springs, Colo.; Cadillac, 22:52:43; Ray Crawford, Alhambra, Calif.; Lincoln, 23:04:06; Jose A. Solana, Mexico City; Oldsmobile, 23:12:29; and Robert S. Korf, Colorado Springs, Colo., Nash, 23:12:49. Although he came in sixteenth for the entire course, the fastest time posted in the final 230 miles was 2:11:43 by Tony Bettenhausen, Tinley Park, Ill., in a Chrysler for an average speed of about 113 mph.

More than 100 cars were entered in the race from Tuxtla Gutiérrez to Ciudad Juárez, but only 35 completed the treacherous course. Aside from numerous mechanical failures and other difficulties, death eliminated three contestants—Mexican drivers José Estrada Menocal and Miguel González and Italian Carlos Panini.

Cadillac and Chrysler Tank Contracts Upped

Both Chrysler and Cadillac have announced expansion of their defense contracts to indicate an increase in the tank production program. Expansion of the tank contract at Cadillac is the fourth one and brings its total commitments to approximately \$750 million. The contract originally was for \$112 million. It is reported that production at the Cleveland Tank plant will be stepped up about 60 per cent.

The Chrysler contract expansion substantially increases the company's

tank engine production schedule. It will require use of the entire facilities of the Michaud plant at New Orleans, La., which covers 1.8 million sq ft, compared with 1.2 million sq ft originally planned for the tank engine job.

Ford Motor Co., Ltd., Building A Four-Cylinder Diesel

Ford Motor Co., Ltd., is reported to be starting production of a four-cylinder Diesel engine as an alternative power unit for a new Ford Major agricultural tractor. It is expected that the engine may also be offered for use in trucks eventually.

The engine is the valve-in-head type with direct injection and removable wet cylinder liners. It is governed over a speed range of 400 to 1700 rpm and develops a maximum of 41.5 hp.

Rolls-Royce to Erect Montreal Engine Plant

According to recent reports, Rolls-Royce, Ltd., plans to build its first engine plant outside of England in Montreal, Quebec. The \$2 million plant will produce jet engines to power T-33 trainers being turned out by Canadair, Ltd., at Cartierville, Quebec.

Firestone to Produce J-47 Engine Parts

Firestone Tire & Rubber Co. has announced that it will soon start production of stainless steel parts for the J-47 jet engine. These will be delivered to General Electric Co. and Packard Motor Car Co., builders of the engine. The parts in question are the principal components through which the high temperature jet itself is channeled through to the aft end of the engine and out into the atmosphere. These assemblies include: the combustion chambers in which the raw fuel is exploded and the transition liner, and the turbine casing and exhaust cone.

Olds Starts Output of 90 mm Tank Gun

Although 20 per cent of the machine tools required for production of 90 mm high velocity tank guns have yet to be delivered, Oldsmobile Div. of General Motors Corp. is in production with several key operations still being performed on temporary facilities. In order to start production as soon as possible, Olds has installed gun boring and turning lathes from surplus World War II machinery stored in government warehouses.

Operations performed in the new 228,000 sq ft plant at Lansing, Mich., include fabricating the breech ring,

INDUSTRIES

breech block, and the 15-ft tube, an extrusion forging supplied by government arsenals. Twenty-three subcontractors are supplying 60 other production parts.

De Soto to Produce Jet Afterburners

De Soto Div. of Chrysler Corp. has been assigned a multi-million dollar contract to build afterburners for the Pratt-Whitney J-48 jet aircraft engine. Tooling for production of the afterburner already is underway at the De Soto plant, but there is some possibility that the job may be moved to Chrysler's new engine plant being built at Trenton, Mich.

Oliver Corp. Awarded Defense Contract

Oliver Corp. has received an order to build main fuselage sections for the Boeing RB-47B Stratojet bomber. The size of the contract was not revealed, but it is indicated that it is substantially greater than the approximately \$10 million worth of defense work Oliver now has for the Army Engineers and Army Ordnance. Most of the airframe assembly work will be concentrated at the Battle Creek, Mich., plant and includes, in addition to the forming, machining, and heat treating of the fuselage section, a considerable part of the inside installations, such as the hydraulic lines, electrical wiring, and heating conduit. Outside suppliers also will furnish certain subassemblies, and the finished airframes will be shipped to the Boeing plant at Wichita, Kans.

GE Builds All-Weather Engine for Use in B-47 Stratojet

General Electric Co. has announced the start of a large-scale program to produce an all-weather engine (the first model of which is the J-47-GE-23) for future models of the B-47 Stratojet. The engine, said to be rated at more than 5800 lb of thrust, reportedly has a comparatively low rate of fuel consumption, and a special ignition system which makes high-altitude starts possible. Other features include: an ice prevention system, a retractable air inlet screen, and a water injection arrangement for increased thrust.

Caterpillar Reveals Expansion Plant

Caterpillar Tractor Co. will build a new plant in York, Pa., as part of a new expansion program which will enlarge the company's facilities by more than 870,000 sq ft. In addition to the new plant, additions will be made to

the Joliet, Ill., operations and some improvements made at the Peoria, Ill., plant. Layouts for the Joliet and York facilities already are far enough along to permit placing of orders for machine tools and equipment.

The new plant to be built at York will have about 360,000 sq ft of space and will be used for production of track and track roller parts for distribution to dealers in the eastern part of the U. S., Canada, and exporters served through East Coast ports. The eastern location will enable Caterpillar to obtain steel from nearby mills which do not now supply its factories in Illinois.

An extension to the present manufacturing building at the Joliet plant will add 230,000 sq ft of space; a separate 280,000 sq ft parts building will be erected; and the heating plant will be enlarged. Improvements at Peoria include a new die and fixture building and new office and shop buildings at the nearby proving grounds.

The largest part of the expansion program will be financed with a long term loan of \$35 million. NPA has granted the necessary permits for construction, and certificates of necessity have been issued for 50 per cent of the cost by DPA. Engineering and design have been started, and construction of the buildings will begin as soon as materials are available.

OPS Approves Packard Retail Ceiling Prices

The Office of Price Stabilization has approved new retail ceiling prices for Packard cars which range from \$116 to \$190 higher than present ceilings. They are in line with the factory wholesale price increases to dealers announced by OPS in Oct.

Dodge Increases Truck Prices

Dodge Div. of Chrysler Corp. recently announced increases averaging 1.14 per cent in the wholesale prices of its trucks. The action was taken in line with an Office of Price Stabilization order permitting ceiling price increases on trucks to include added costs of conversion steel. Increases in factory retail prices at Detroit, Mich., average \$20.41 over the entire Dodge line.

Renault May Open Plant in Norfolk, Va.

Regie Nationale des Usines Renault, manufacturers of the French Renault Car, are said to be considering opening a body assembly plant in Norfolk, Va. New York and New Orleans are also being given consideration as possible sites, and a final decision is expected early in 1952. The contemplated plant will produce the small, rear-engine C-4, of which the firm expects to sell approximately 2200 in the U. S. next year.

National Automotive Fibres Completes New Calif. Plant

National Automotive Fibres, Inc., recently announced completion of a new manufacturing plant at Orange, Calif. The project contains approximately 40,000 sq ft of floor space and is situated on a seven-acre lot with ample room for future expansion.

Pacific Automotive Show Set for Los Angeles

The 1952 Pacific Automotive Show will be held in Los Angeles, Calif., Feb. 28 to March 2. The show will be the fourth sponsored by automotive wholesalers in the 11 western states.



COMBINATION TRAILER-CAR

The experimental coach above, developed by Timm Aircraft Corp., is designed to take the place of a house trailer and car for sportsmen and tourists. The 7110-lb. vehicle is powered by a Ford V-8 S-9-T-6000 engine and provides accommodations for four persons with complete sleeping, heating, refrigeration, washing, and sanitary facilities. It is 28 ft long, seven ft, four in. wide, and eight ft, six in. high.

News of the AUTOMOTIVE

Chrysler Power House in Metal Scrap Drive

Chrysler Corp. will make a major contribution to the nation's industrial scrap drive with an estimated 800 tons of metal resulting from the complete scrapping of its old power house at the Dodge main plant in Detroit, Mich. Four boilers weighing over 60 tons each and the same number of stokers weighing five tons apiece already are being dismantled. All other equipment, such as coal bunkers, a main steam line and trestle, pumps, steel ladders, flooring, and heavy construction beams, also will be scrapped. The power house has been replaced by a new one with larger capacity.

Chrysler also reports that through Nov. 15, its dormant scrap drive had netted more than 4000 tons of obsolete parts and tools, dies, jigs and fixtures, and worn-out equipment in its own and vendors' plants. Approximately 1930 tons came from supplier plants with the balance from Chrysler's own operations.

Packard Scrap Drive Yields 1250 Tons

Packard Motor Car Co. already has rounded up 1250 tons of dormant scrap in its continuing scrap metal program. Of the total, about 300 tons have been processed and delivered to the company's own foundry with the balance going into regular scrap channels. About 275 tons of dies, tools, and fixtures held by vendors have been re-

leased by Packard for scrapping. The company estimates that the recovered scrap, when converted to high grade steel, would aid in the building of about 1500 J-47 turbojet engines.

Los Angeles Car Show Scheduled for March

The Los Angeles Automobile Show, sponsored by the Los Angeles Motor Car Dealers Association, will be held March 7 to 16. This is the association's 29th show but the first one held since before World War II.

Government May Take Control Over Scrap

If private industry fails to provide enough steel scrap to keep mills operating, the government may have to step in to take over the job, according to Manly Fleischmann, DPA administrator. At a recent emergency meeting in Washington, D. C., attended by scrap dealers and users of scrap, Mr. Fleischmann reported that scrap supplies in the inventories of steel mills are down 30 to 50 per cent from a month ago, with some mills holding less than seven days supply.

He also pointed out that if it is necessary to close mills because of a scrap shortage, manufacturers of automobiles and other consumer durable goods might suffer a reduction in steel allotments, since allocations have been based on the assumption that steel mills will operate at full capacity.

NPA to Order More Old Cars Scrapped

NPA is planning drastic action to move old automobiles out of junk yards to bolster the nation's critical supply of steel-making scrap. The agency is preparing an order which will provide that on March 1, 1952, wreckers can have no more cars on hand than the number they scrapped during the preceding 90 days. It is estimated that by establishing the March 1 inventory on the basis of cars scrapped in the preceding three months dealers will move as many cars as possible into scrap channels in order to build a high inventory ceiling. The order would not apply to late model cars, designated as 1946 or later. Such late models may be kept on the wrecker's lot as a source of replacement parts. NPA estimates the program could turn up 2 million tons of scrap in the next two to three months.

Elect Pigott Head of ASME

Reginald J. S. Pigott, director, Engineering Div., Gulf Research and Development Co., was elected president of the American Society of Mechanical Engineers at its recent annual meeting in Atlantic City, N. J. The ASME medal, conferred annually for distinguished service in engineering and science, was awarded to Glenn B. Warren, general manager, Turbine Divs., General Electric Co.

Consolidated Vultee Sets Up Ordnance Laboratory in Tex.

An Ordnance Aerophysics Laboratory has been established at Daingerfield, Tex., as a separate division of Consolidated Vultee Aircraft Corp. Facilities at the new division include a supersonic wind tunnel, a ramjet engine test burner, and a high-altitude test chamber for testing large-scale ramjet engines at simulated altitudes approximately 20 miles above the earth and at four times the speed of sound.

DPA Establishes Board to Review Idle Plants

The Defense Production Administration recently established a Facilities Review Board to screen all idle production facilities with a value of \$1 million or more (including the cost of machine tools) and call them to the attention of military procurement officials. The move is designed primarily to shuttle defense contracts to plants which may or do close down in whole or in part because of materials shortages.



WATER TEST FOR OPELS

A German Opel car is put through a water course as part of a series of trial tests. The manufacturing company, owned by General Motors Corp. and located at Rüsselsheim, Germany, is said to produce 350 small and medium-sized vehicles daily.

(Wide World)

INDUSTRIES

1951 Car and Truck-Bus Output Estimated at 6,806,000 Units

Although 1951 is not yet over, it now is close enough to the end of the year to state that the automobile industry has had a very good year. In fact, it will be the second highest production year on record, being surpassed only by the phenomenal output of 1950.

Even though passenger car production was curtailed during the third and fourth quarters, output during the first half of the year was so heavy that total production of new cars this year is estimated at 5,373,000 units, or only 19 per cent below the all-time high of last year. Trucks and buses, on the other hand, will reach an all-time high this year with production estimated at 1,433,000 units. As a result, combined car and truck-bus production in 1951 will reach an estimated 6,806,000 units, or roughly 1.2 million under the 1950 record total, but almost a half million above the 1949 level. It must be remembered, of course, that truck-bus production includes an unrevealed, but probably substantial, number of military vehicles, so that strictly civilian commercial truck production probably is not at an all-time high.

Wholesale value of passenger cars and trucks produced this year will show a drop from last year. It is estimated that passenger cars will have a wholesale value of \$7.29 billion, compared with \$8.633 billion last year. Trucks, however, show an increase in wholesale value, totaling an estimated \$2.263 billion compared with \$1.747 billion a year ago. Combined value of cars and trucks, however, is down from a year ago, standing at an estimated \$9.553 billion, compared with \$10.38 billion in 1950. It is estimated that value of replacement parts and accessories will hit \$2.5 billion for 1951, compared with \$2.140 billion a year ago.

One phase of the industry's operations that shows an undeniable upward trend is exports. Passenger cars sold abroad this year are up sharply to 260,000, representing 4.9 per cent of total output. A year ago car exports numbered 152,928 units, or 2.3 per cent of total production. Trucks and buses sold abroad also showed a sharp gain, rising to 218,000, or 15.2 per cent of total production, compared with 150,760 units, or 11.3 per cent of total production a year ago. Total exports of cars, trucks, and buses in 1951 is estimated at 478,000, or seven per cent of total production, compared with 306,901 units, or 3.8 per cent of total production in 1950.



Arme

DELTA-WINGED JET

This in-flight view of the Avro 707A Delta, latest British high-speed research aircraft, clearly shows the novel installation of air intakes at the wing roots. The plane is powered by a single Derwent jet engine. Performance details are secret.

Car Makers to Absorb One Cent Wage Hike

The automobile industry will be called on to absorb an extra \$21 million a year in wage costs as a result of the one cent an hour increase, effective Dec. 1, called for under labor contracts which tie wages to the cost of living. There is no possibility of recovering the added costs under the Cephart Amendment, since that act has a cut-off date of last July on labor costs.

Actually, the industry narrowly missed having to pay two cents an hour. If the index had stood .01 per cent higher, still another penny an hour would have been required. The revised Bureau of Labor Statistics index for Oct. 15 rose to an all-time high of 187.4, 6.7 per cent higher than a year ago and 10.1 per cent higher than it was in June, 1950.

Ford to Help Develop Low-Grade Ore Unit

Ford Motor Co. has entered into an agreement with Cleveland-Cliffs Iron Co. for a multi-million dollar development project for mining and refining low-grade iron ore. The two companies will develop an open pit mine in the Upper Peninsula of Michigan that has been unused since 1920. Construction of the first unit for producing the ores will start immediately, and it is expected that it will be producing about

200,000 tons a year by 1953. A second unit of about the same capacity is expected to be in production by 1955.

Also in the planning stage is a plant to reduce the ore to iron pellets suitable for either blast or open hearth furnaces. However, Ford is going ahead with a new sintering plant of its own to take care of immediate needs.

OPS Boosts Ceiling Price of Henry J

OPS has announced increases in the retail ceiling price for two models of Kaiser-Frazer's Henry J passenger cars. New price of the standard model Henry J is \$1331.57, or \$80 higher than previously. The ceiling on the deluxe model was increased \$88.09 to \$1466.38. OPS also issued price ceilings at retail for all other K-F passenger cars but they are unchanged from existing ceilings. K-F stated that for the time being, at least, it had no plans to put the higher ceiling prices on the Henry J into effect.

Avro Canada Offers Film on Jet Planes

Avro Canada has made available for public showings a 16mm film entitled "Screaming Jets." The impressive film shows a number of the world's outstanding jets, such as the Avro Canada Jetliner, de Havilland Comet, Gloster Meteor, de Havilland Vampire, North American Sabre, and Russian MIG-15.

News of the AUTOMOTIVE

1951 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Total	1951	1950
First Quarter	1,601,053	376,312	2,011	1,980,176	1,037,469	
Second Quarter	1,497,005	410,280	2,399	1,909,684	2,112,818	
Third Quarter	1,174,245	341,560	2,191	1,516,026	2,247,666	
Total—9 Months	4,273,103	1,128,162	6,601	5,407,866	5,967,975	
October	414,833	110,737	1,174	525,444	780,568	
Total—10 Months	4,687,636	1,238,919	7,775	5,934,330	6,758,552	

1951 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001- 10,000	10,001- 14,000	14,001- 18,000	18,001- 26,000	Over 26,000	Total
First Quarter	184,304	70,939	28,073	67,688	18,088	18,708	10,443
Second Quarter	174,654	73,966	33,930	77,002	18,915	21,463	10,320
Third Quarter	139,438	64,171	21,862	70,387	17,081	18,302	10,519
Total—9 Months	478,398	209,136	81,895	215,078	54,668	56,501	31,282
October	42,046	18,946	6,599	23,445	6,214	8,325	5,171
Total—10 Mos. 1951	520,442	228,081	88,295	220,523	60,300	66,826	36,453
Total—10 Mos. 1950	525,336	225,783	77,266	181,164	43,318	57,588	23,391

*—Automobile Manufacturers Association.

Bureau of Standards to Run Engine Tests

The National Bureau of Standards is now conducting a research program aimed at increasing the amount of power derived from a gallon of gasoline in automobile engines. Basically, the project will explore factors that cause power-wasting engine knock, and tests specifically are designed to discover more efficient anti-knock fuel additives. The program also will investigate the desirability of certain improvements in engine design in the manufacture of gasoline.

Fisher Defense Work Aids Suppliers

Fisher Body Div. of General Motors Corp. reports that its defense projects already require 60 suppliers for castings, 25 for forgings, 20 for rubber, 50 for stampings, 150 for standard parts, 50 for miscellaneous small machine parts and assemblies, 10 for miscellaneous large assemblies, 40 for large machine parts, and 95 miscellaneous suppliers.

American University to Hold Transportation Institute

The School of Social Sciences and Public Affairs of the American University has announced that it will conduct its Fourth Institute of Industrial Transportation and Traffic Management in Washington, D. C., Jan. 8 to 25. The course is designed to give junior executives, who have a basic understanding of general transportation problems or of traffic management, an opportunity to improve their knowledge and experience.

Gyro Compass Developed for Rigorous Usage

A light-weight gyro compass, said to withstand rough treatment in any type of vehicle, has been developed under contract with the Army Corps of Engineers. Weighing only 67 lb, the self-contained unit is designed to operate in temperatures from -65°F to 130°F. It was built by Arma Corp., will undergo field evaluation soon, and is expected to be standardized within two years.

Craigmire Named to Head NMTA

Charles S. Craigmire, president and director of Belden Manufacturing Co., was elected president of the National Metal Trades Association at its 52nd annual convention in Chicago, Ill., recently. Others elected to office were: first vice president, Earle S. Day, vice president and general manager of Collyer Insulated Wire Co.; second vice president and treasurer, Norman L. Rowe, vice president of Ideal Roller and Manufacturing Co.

ASM Establishes Fund for Teacher Awards

The American Society for Metals recently announced that it will award a total of \$6,000 annually to teachers of metallurgy in any school in the U. S. or Canada. Three awards of \$2,000 each will be given to those teachers who are judged to have contributed most to the general progress of the profession. Candidates for the awards must be under 40 years of age on April 1 of the award year.

Goodyear to Enlarge Alabama Plant

Goodyear Tire and Rubber Co. is planning to erect a large addition to its plant at Gadsden, Ala. If materials for the expansion are approved by the Government, the existing plant will be expanded by 270,000 sq ft of floor space so that production of large military airplane and truck tires can be increased substantially.

Ekstrom, Carlson Expands Plant

Ekstrom, Carlson & Co. has completed a \$250,000 plant expansion at its Rockford, Ill., plant and is installing new equipment for machining and assembling its line of woodworking and metalworking machine tools. The new facilities are attached to the far west end of the present plant.

Rotex Punch Opens Second Plant

The Rotex Punch Co. has announced the opening of a second plant in Oakland, Calif. Incorporating 7000 sq ft, the new facility will be used for office, assembly, warehouse, and shipping space. At the same time, the firm disclosed that it will shortly add a new power model press to its line which it claims will offer 18 different punch and die sets on a rotating turret.

NLGI Meeting Draws Record Attendance

The 19th annual meeting of the National Lubricating Grease Institute in Chicago recently drew a record attendance of 446 delegates. Officers elected to head the organization in 1952 were: president, George E. Merkle (Fiske Brothers Refining Co.); vice president, Wayne W. Albright (Standard Oil Co., Indiana); and treasurer, C. B. Karns (Esso Standard Oil Co.).

Goodyear Producing Rubber From New Dow Raw Material

RFC has announced the start of commercial manufacture of synthetic rubber from a new raw material, vinyl toluene, a Dow Chemical Co. product, at the Goodyear Tire & Rubber Co. plant in Akron, O. In the new process, butadiene is combined with vinyl toluene, rather than styrene, to make synthetic rubber. The product is being made in a Dow pilot plant and large-scale production is expected to start toward the end of 1952. It is claimed that tests have proved that normal performance is obtained with tires made from the new synthetic.

INDUSTRIES

U.S. Makes Settlement With Power Jets, Ltd.

The Defense Department has completed an agreement with Power Jets, Ltd., involving a payment of \$3,200,000 to the British firm for past and future Government-wide use of patents relating to jet engine production. The agreement settles a claim by the British company that the U. S. was infringing on British-held patents and at the same time licenses the U. S. Government to make use of all patents now registered by the British firm.

Allis-Chalmers Producing Multi-Purpose Tractor

The Defense Dept. has revealed that a multi-purpose tractor weighing 22 tons with a top speed of 40 mph and the ability to climb 35-degree slopes is now in production at the Allis-Chalmers plant in LaPorte, Ind. It will be used primarily to tow the 75 mm anti-aircraft gun and heavy calibers up to the eight-in. howitzer, although it can be employed as a wrecker, bulldozer, or general cargo hauler also by means of interchangeable bodies.

Stanley Builds Ejection Seat for B-47 Stratojet Bombers

The Stanley Aviation Corp., Buffalo, N. Y., has developed a military aircraft ejection seat that thrusts pilots down through the floor of high-speed planes when they have to bail out. The company claims to have \$1,500,000 in orders for these pilot ejection seats for installation in the U. S. Air Force's B-47 Stratojet bombers.

A.S.T.E. Exposition Draws Great Interest

According to a recent announcement, applications for exhibit space in the 1952 American Society of Tool Engineers' industrial exposition, to be held in Chicago, Ill., March 17 to 21, are coming in rapidly. The forthcoming show will have an exhibit floor space of 100,000 sq ft with an estimated attendance of approximately 80,000.

Five feature days have been scheduled at the 1952 exposition which tie in with the technical program of the 20th annual A.S.T.E. meeting that will run concurrently with it. These five days, and the special interests they will cover, are: inspection and quality control day; metal cutting day; materials forming day; grinding and finishing day; machine accessories, drives, and controls day.

Ford of Canada to Build Machine-Receiving Plant

Ford Motor Co. of Canada, Ltd., recently announced that it will soon build a new machine-receiving plant and incinerator in Windsor, Ont. The project is estimated to cost in the neighborhood of \$100,000.

Truck Owners to Convene in Washington, D. C.

Plans are now being formulated by the National Council of Private Motor Truck Owners for its 13th annual convention, to be held in Washington, D. C., Feb. 7 and 8, 1952. A record attendance is expected to hear discussions of many motor transport problems.

Engine Part Reduction Plan Almost Complete

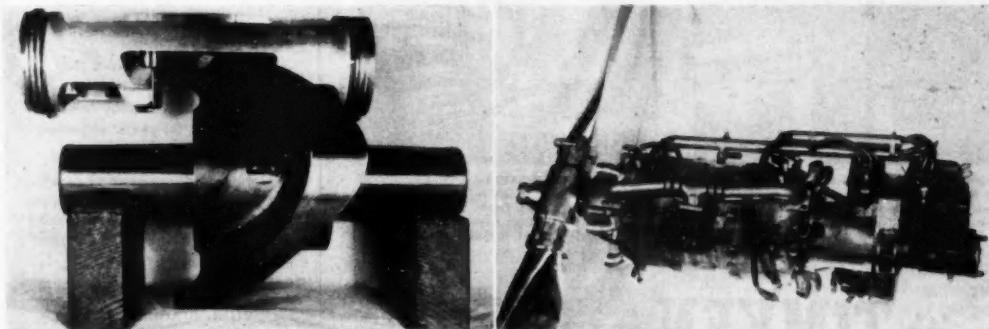
A four-year program to standardize gasoline engine parts with high-mortality rates used by the Army, Navy, and Air Force is drawing to a close. At the same time, maximum interchangeability is being attained. According to Government sources, 1187 different fast-moving parts on 138 different engine models could be reduced to a family of only 63 parts, and 15 bore sizes could be reduced to five basic sizes. It is expected that the program will be expanded to cover Diesel engines as well.

Ryan to Expand Production of Missile Rocket Motors

Ryan Aeronautical Co. reports that it will make a ten-fold increase in its production of complete rocket motors for surface-to-surface missiles. Ryan has built rocket motors under contract with Douglas Aircraft Co. for an Army Ordnance Corps missile, but the latest contract has been granted by the Firestone Tire and Rubber Co., Los Angeles, Calif.

Nash Rambler Wins Norfolk Contest

A 1951 Nash Rambler Country Club hardtop convertible emerged as the winner in the 400-lap stock car championship race held recently in Norfolk, Va. The car finished the race in two hours and 11 minutes without a pit stop and was driven by Joe Weatherly, veteran stock car driver.



AWAITING CAA STAMP OF APPROVAL

The 12-cylinder, "round" type engine of Herman Engineering Co., is said to be undergoing final tests for a CAA Type certificate. It has six integral double-end pistons actuating a cylindrical cam. Other characteristics of the engine are a bore of three and one quarter in. and a stroke of three and three quarters in. It is claimed that the aircraft version (right-hand photo) of the engine produces 210 bhp at 1850 rpm. The left-hand illustration above shows the main cam with one of the pistons and one of two rollers in each piston. The cam is mounted on a straight shaft supported on two plain bushings. Since the cam provides for four strokes per revolution of the shaft, the two valve cams are mounted on the main shaft. This combination provides a shaft speed half that of conventional engines.

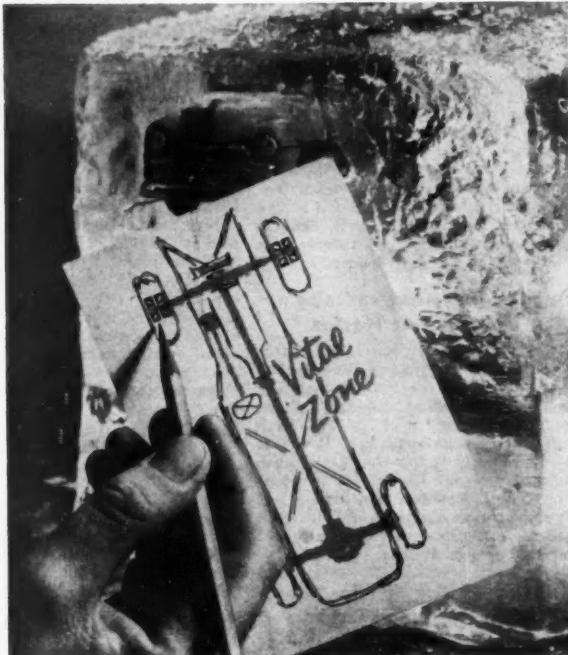
Design freeze or not, this sales appeal stays hot!

WHATEVER the effect of a design freeze — if one should come — this much is certain: the same big, basic appeal that has always sold cars will *keep on* selling them. Important as style changes are in promoting sales, the appeal that has kept the public buying cars over the years has been the big *value* offered by the auto makers.

Today, motorists are more conscious of value than ever, especially in the moving parts — the "vital zone" — where value counts the most. A helpful step toward giving customers "vital zone" value is to keep this simple formula in mind when buying component parts:

$$\text{Value} = \frac{\text{quality} + \text{service} + \text{public acceptance}}{\text{price}}$$

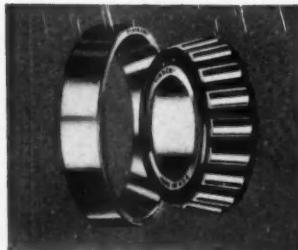
It shows that price must be weighed in relation to the factors *above* the line. Timken® bearings lead in quality, service, and public acceptance. And in terms of value features, their prices are lower today than ever. So Timken tapered roller bearings are your best value — by this formula or any other. The Timken Roller Bearing Company, Canton 6, Ohio.



How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



TOPS IN ACCEPTANCE. The trade-mark "Timken" is the best-known name in bearings. That's because Timken bearings are so widely used, do such an outstanding job, and are consistently advertised. A few of the magazines carrying Timken bearing advertising are shown above.



ALL BUT TWO CAR MAKERS use Timken tapered roller bearings on the pinion, toughest bearing application on the car. Over the years, Timken tapered roller bearings have been proved for value in every application throughout the "vital zone".

it's **TIMKEN** for **VALUE**
THE TRADE-MARK OF THE TIMKEN ROLLER BEARING COMPANY
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER □ BEARING TAKES RADIAL □ AND THRUST → □ LOADS OR ANY COMBINATION



ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers



General Motors Corp., New Departure Div.—Charles D. McCall has been appointed general sales manager.

Wagner Electric Corp., Automotive Equipment Div.—J. R. Rose has been appointed sales manager.



Ford Motor Co.—V. Y. Tallberg has been appointed executive engineer, administration, R. F. Kohr, executive engineer, general engineering, and H. C. Johnson, controller, engineering staff. Other changes include: H. F. Copp, acting special military vehicles engineer; N. L. Blume, Lincoln-Mercury car engineer; H. H. Gilbert, laboratory engineer; H. A. Matthias, development engineer; H. G. English, transmission engineer; and A. M. Wauters, research engineer.

General Motors Corp., AC Spark Plug Div.—Edgar H. Francois has been named sales manager of replacement products.

Westinghouse Electric Corp.—Tom Turner has been appointed vice-president in charge of manufacturing and labor relations. W. B. Anderson has been chosen assistant to the vice-president for defense products, while Frank L. Snyder succeeds him as manager of the aviation gas turbine division. In other changes, R. C. Bergvall was named manager of engineering for defense products, B. M. Brown, sales manager for defense products, and M. A. Dotterer, manager of production for defense products.

American Brake Shoe Co.—William M. Black and Joseph L. Mullin have been appointed president and vice-president, respectively, of the Electro-Alloys Div. Walter G. Hoffman, formerly president of the Electro-Alloys Div., has been named assistant to the vice-president for research and development.

Kaiser-Frazer Corp.—John B. Banks has been named chief production engineer. F. A. W. Anger has been selected to succeed him in his former post as automotive works manager.

National Motor Bearing Co.—L. C. Cole has been appointed director of sales, succeeding Park Q. Wray who, although retired, will continue to serve as a director and sales and merchandising consultant.

Consolidated Vultee Aircraft Corp.—Thomas G. Lanphier, Jr., has been elected a vice-president.

Chrysler Corp., Export Div.—Lloyd H. Covenee has been named production supervisor.

Borg-Warner Corp., Marvel-Schebler Products Div.—Robert J. Minshall has been appointed president and general manager. G. V. Patrick has been named vice-president and assistant general manager.

General Motors Corp.—R. H. Ringo has been appointed resident comptroller of the new dual purpose plant at Arlington, Tex.

A. V. Roe Canada, Ltd., Gas Turbine Div.—Thomas S. McCrae has been appointed general manager.

Keppers Co., Inc., Piston Ring Dept.—Henry G. Chiles has been named manager of sales promotion and advertising.



Crescent Co., Inc.—John M. Sapinsley has been chosen president.

Warner Electric Brake & Clutch Co.—Donald R. McComb has been named advertising manager.



Necrology

Chester S. Ricker, 63, widely known figure in the automobile industry, died Dec. 5, in Detroit, Mich. Credited with developing the first accurate timing devices for races, he scored and timed his 35th annual Indianapolis race this year. Active in the early automobile companies and a member of the Detroit SAE chapter, he was once associated with Chilton Co. in an editorial capacity.

John W. Thomas, 71, former president and chairman of the board of Firestone Tire and Rubber Co., died Nov. 26, in Akron, O.

Raymond C. Force, 71, first president and a member of the board of directors of Caterpillar Tractor Co., died Nov. 15, in Oakland, Calif.

Frederick A. Brechter, 53, vice-president and co-owner of Vandyke Churchill Co., died Nov. 22, in Stratford, Conn.

Carrie B. Keller, 88, mother of K. T. Keller, chairman of the board of Chrysler Corp., died Nov. 28, in Detroit, Mich.

Walter Six, 67, inventor of the steel piston ring for automobiles, died Nov. 26, in Indianapolis, Ind.

William P. McQueen, 58, secretary of A. V. Roe of Canada, Ltd., died Nov. 24, in Toronto, Ont.

Ernest E. Wemp, 70, inventor and consultant engineer for Long Manufacturing Div., Borg-Warner Corp., died Nov. 24, in Detroit, Mich.

Mack N. Hellings, national mid-get championship racer in 1949, was killed in an airplane accident recently.

Henry L. Trebert, former general superintendent of E. C. Sterns Co. and founder of H. L. Trebert Auto Works, died recently, in Canandaigua, N. Y.

OPERATION:
Machining 3140 and 2112 steel on automatics

SPEED:
1200 to 1300 RPM

FEED:
.003 to .004 per RPM

DOWN 82%

when Michigan valve firm
switches to **ANTISEP**
ALL-PURPOSE BASE

The former coolant cost this company \$183.75 per month. When they tried Houghton Antisep A. P. Base, mixed 1 part to 20 parts water, their monthly cost dropped to only \$33.00—an 82% saving in coolant costs.

This firm also reports a better finish is obtained, tool life is lengthened, and operators are better satisfied.

You'll realize how greatly Houghton Antisep Base cuts costs as soon as you start using it. Your machinists mix as much as 30 parts of plain water to 1 part of this all-purpose base. It will

handle better than 90% of your metal-cutting jobs.

Use Antisep for general machining work . . . for automatics . . . for stamping and forming. You handle one instead of many cutting oils. You save space, write smaller inventories, simplify selection!

Why don't you ask the Houghton Man to arrange a convincing test on your tough machining operations? Or if you prefer further information in advance, write to E. F. Houghton & Co., Philadelphia 33, Pa. We'll also send you the booklets mentioned.



GET THESE NEW BOOKLETS
WITHOUT CHARGE

"Houghton Defense Production Data" is a factual record of heat-treating and machining experience in processing Shells, Cannon, Small Arms, Ammunition, Rockets, etc., based on our extensive metalworking "know-how." This 52-page illustrated book is particularly valuable to plants switching to defense production. Write for your copy . . . at the same time, we'll send you the new 32-page booklet on Antisep Base, "Getting Down to Cases on Metal Cutting."

ANTISEP
ALL-PURPOSE BASE
A new antiseptic metalworking fluid
with a 100% water-soluble, non-oily content

E. F. HOUGHTON & CO.
PHILADELPHIA - CHICAGO - DETROIT - SAN FRANCISCO



Ready to give you
on-the-job service . . .



Guarding Signal Corps Equipment from Fastener Failure

Communications equipment for mobile tactical units must be sturdy enough to follow the front lines cross-country and along battle-pitted roads. This AN/GRC-3 radio equipment, installed in all types of combat vehicles, must be ready to provide communications liaison between advancing units. And it must be ready twenty-four hours a day, despite the roughest operating conditions. For vital equipment of this type there is a growing recognition of the need for self-locking fasteners to protect the expensive and critical component parts which make them function.

Helping to keep this equipment operating by holding against severe and long-continued vibration are many ESNA machine screw hex nuts and

clinch nuts. These Elastic Stop Nuts—with fungus proof nylon inserts for extended reuseability—offer the advantages of secure fastenings and at the same time simplify maintenance and field repairs.

ESNA HEX NUTS are quickly installed with power tools—permit accurate, precise adjustments, lock at any position along the bolt, and keep fastenings tight until deliberately removed.

ESNA CLINCH TYPE NUTS are available in various shank lengths for swaging on different gauges of sheet metal. Permanently clinched into place on frame members or to sections of the chassis, they provide permanent and pre-positioned fasteners for assembling panels or mounting component parts.



Red Nylon locking inserts
Reusable over 100 times

DESIGN AHEAD WITH ESNA

THE FAMOUS RED ELASTIC COLLAR IS VISIBLE EVIDENCE OF LOCKING SECURITY

Threadless and permanently elastic, it provides these 4 outstanding features:

1. Protects against nuts loosening due to VIBRATION
2. Keeps locking threads CORROSION FREE
3. Provides for accurate BOLT LOADING
4. Seals against LIQUID LEAKAGE along the bolt threads

And can be used again and again



ELASTIC STOP NUTS

DESIGN HEADQUARTERS FOR VIBRATION-PROOF FASTENERS

AUTOMOTIVE INDUSTRIES, December 15, 1951

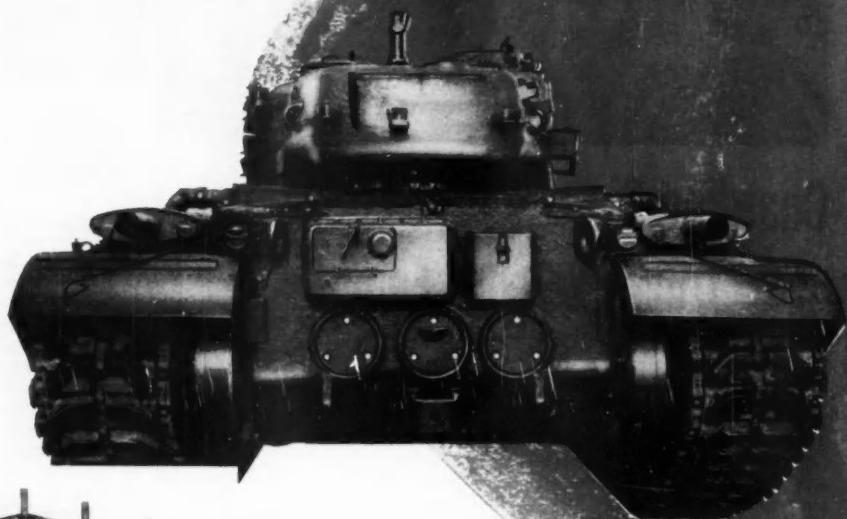
Specify ESNA hex and clinch nuts with the new red nylon insert to assure adequate locking torque through hundreds of on-off applications.

When you design equipment that needs similar fastening security, specify Elastic Stop Nuts. For complete dimensional and installation data write to Elastic Stop Nut Corporation of America, Vauxhall Road, Union, N. J.

STROMBERG



Selected for STAMINA!



Stromberg Carburetor
Type NAV SG-3
used on M-46 Tank

Built to operate under the most adverse conditions imaginable, every component part of an Army Tank must be engineered to withstand groteling, stamina.

It was, therefore, only logical that for combat requirements for medium tank M-46 the Army Ordnance Corps would select Stromberg for the job. Stromberg has, since the earliest days of the automotive industry, been synonymous with stamina.

That's why, today, manufacturers interested in long life carburetor performance find their answer to this problem in Stromberg* Carburetors.

*REG. U. S. PAT. OFF.

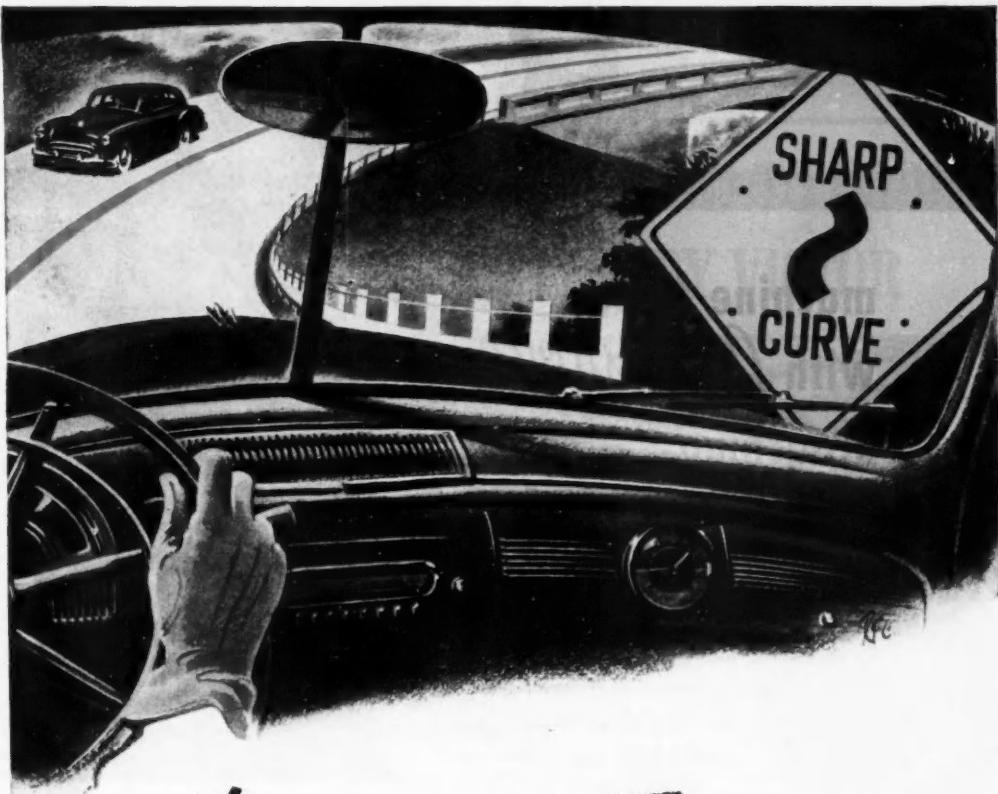
ECLIPSE MACHINE DIVISION OF

• Standard Equipment Sales: Elmira, N. Y.

• Service Sales: South Bend, Ind.

Expert Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N. Y.





You can count on Thompson
FOR "ENGINEERED STEERING"

Thompson Products' Detroit Plant has been working closely with automotive engineers for 35 years... engineering safe steering into powerful, high-speed cars and trucks.

Today, Thompson makes more steering linkage for cars, trucks and tractors than anyone else in the world.

Thompson's research, experience and manu-

facturing facilities are *always* at the disposal of all automotive manufacturers.

With its modern plant, located in the heart of the automobile center, Thompson can and does supply top-quality steering parts.

Call on us to help solve your steering problems. Thompson Products, Inc., 7881 Conant Avenue, Detroit, Michigan. Phone: WA 1-5010.

Thompson  **Products, Inc.**
DETROIT DIVISION



machine faster with *Continuous* broaching

Many types of work can be surface broached on Footburton machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Cutting tool maintenance costs are low. We will be glad to make our recommendations on Footburton Surface Broaching Machines based on our many years in handling similar work.

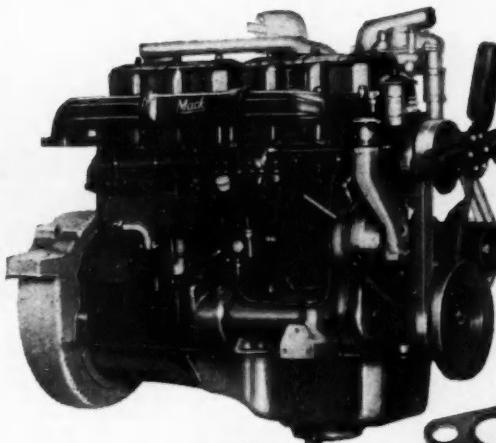
THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building

- Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.



FOOTBURT machine tools

... a time tested line of machine tools



SEALED TO ORDER BY VICTOR



PATENTED HEAD GASKET PROTECTS MACK ENGINE PERFORMANCE

A feature of Mack diesel engine-head sealing is the use of highly compressible Victoprene grommets retained by bond to an inner steel member at water holes in the gasket. Combined with special heavy-duty metal-asbestos construction, this feature insures equally efficient and dependable sealing of coolant or lubricant openings and combustion chambers.

Victor Gives Sealing Satisfaction Since 1909

Mack's exacting requirements for this special gasket were ably filled by Victor. Leading in automotive sealing products development since 1909, Victor has the know-how to give effective help on special problems. Whether you write the specifications, or invite Victor's help, you get full benefit of unmatched facilities for developing, testing, and manufacturing gaskets and oil seals for all requirements.

LEAKPROOF COOLANT SEALING WITH VICTOPRENE

Designed especially for Mack diesel engines, this gasket combines heavy-duty sealing of combustion chambers with durable, leakproof sealing of water ways which are outside the line of studs. Grommets of Victoprene, a Victor-developed synthetic rubber, are molded-in and chemically bonded to a metal retaining member at water openings. Unaffected by engine temperatures, Victoprene is highly efficient in retaining hard-to-hold anti-freeze solutions.

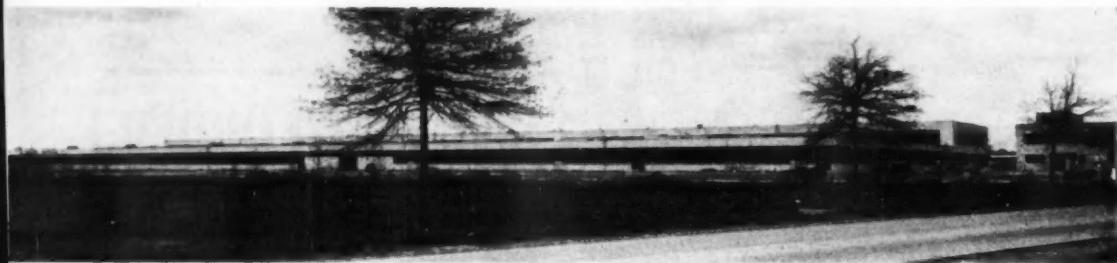
For maximum resistance to blowout, breakdown, and corrosion, gasket construction utilizes Victor-milled long fiber asbestos filler, with copper case top and bottom, reinforced with steel at combustion chamber openings.

Where can we help you get better sealing?

Victor Manufacturing & Gasket Co., and its affiliate, Victor Sealing Products Co., Inc., P. O. Box 1333, Chicago 90, Ill.

VICTOR
"ORIGINAL EQUIPMENT"
Gaskets and Oil Seals
SEALING PRODUCTS EXCLUSIVELY





Seen in this view is the south end of the administration building — extreme right — and almost the entire side and front of the manufacturing building.

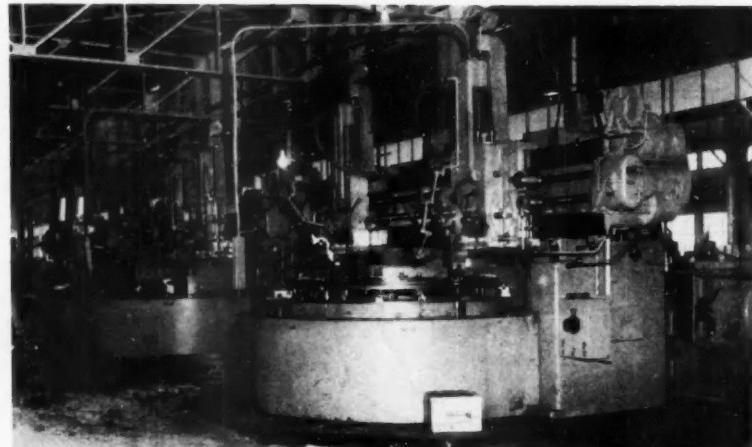
Chrysler's New Tank Plant

THE all new multi-million dollar Chrysler Corp. tank plant construction program at Newark, Del. is rapidly nearing completion and approaching the mass production phase. For the manufacture of the M-48 medium tank and the T-43 heavy tank, the plant is making use of the most modern machinery that is available.

Constructed on a tract consisting of about 240 acres, the manufacturing plant will provide approximately 900,000 sq ft of floor space under one roof. Besides the manufacturing building, the complete setup includes an administration building, a boiler plant, a final paint shop and tank repair shop. Based on presently projected schedules, the tank plant is expected to employ approximately 3500 production workers besides about 500 for administration purposes.

As depicted by the vertical boring mill illustration on this page, as soon as some of the machines were installed they were immediately placed in operation—note the chips on the floor at the left of the illustration. Even though the plant is still in the construction stage, there is a limited amount of production being carried out.

Both the T-43 and M-48 tanks will be powered by 820 hp engines to be built by Chrysler Corp. in a new plant at New Orleans. Although many facts concerning the T-43 heavy tank are still classified, Army officials have disclosed that it weighs at least 50 tons and has unusual speed and maneuverability. The M-48 is an improved model, designed by Chrysler engineers, similar to the General Patton II which is currently being used in Korea.



In the partially completed manufacturing building are three 120 in. vertical boring mills which were among the first tools to be permanently installed. These mills are used for the machining of the tank turret ring. As the chips on the floor indicate, the machines are already in production.

Faster Handling of Palletized Parts

Fig. 1—Pallet loads of parts—automotive instruments on the second and sixth floors. Alemite on the third, fourth and fifth—are carried on fork trucks to elevator landings. Here they are deposited on roller track sections by the truck operator who then signals for the elevator and returns for another load.

ROLLER-TRACK sections installed at each of seven elevator landings in building Number 8 at the main plant of Stewart-Warner Corp., Chicago, permit a moderate-capacity freight elevator recently installed by the Otis Elevator Co. to move over 200 tons of pallet-loaded automotive instrument and Alemite parts between floors each day.

This truck-conveyor-elevator material handling system allows the fork-truck operator to pick up a pallet load of materials, parts or finished goods, carry it to the elevator landing, set it down on the track outside the elevator, signal the elevator and then go for another load, Fig. 1.

When the elevator stops at the floor, the attendant pulls the waiting pallet onto a roller conveyor in the elevator, carries it down to the first floor, and pushes it off the elevator and onto a roller track on the landing outside the elevator.

The roller track sections, laid right up to the sill of the elevator hoistway landing, permit one man both to run the elevator and to move loaded pallets on and off. Because there are front and rear entrances to the elevator at the first floor landing, roller tracks are installed outside both doorways.

The elevator is in almost constant motion during each eight-hr shift because it seldom has to wait long at a floor to be loaded or unloaded. Three roller track sections installed on the platform of the car permit the elevator to carry two pallet loads at a time. Track sections on the first floor are long enough for five and eight pallets, respectively, while those on each upper



floor can hold three pallets in a row at the same time.

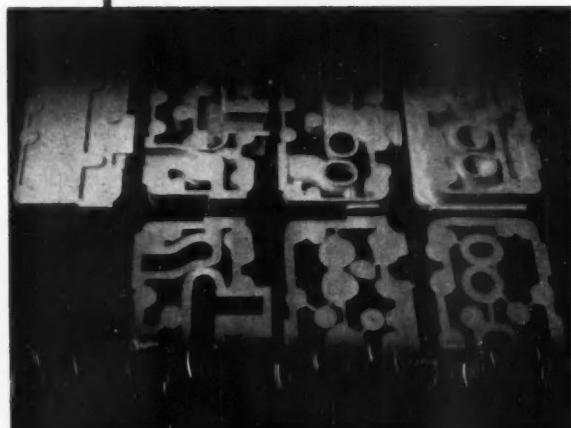
Even though the 3½ by 4-ft pallets carry from 500 to 2000-lb loads of automotive parts, the use of the roller conveyors makes their handling easy. In some instances, a pallet jack is used instead of a lift truck to carry loads to and from the track sections.

Further to speed freight handling, the elevator rear entrance is equipped with a power-operated hoistway door. The controls for this door are located at the front of the car and are arranged so that the attendant can operate both front and rear doors at the first floor without leaving his station. This is particularly helpful when the car is fully loaded and there is not adequate space for the operator to get to the rear door.

The 200-fpm elevator is capable of making 265 round trips per eight-hr day, carrying one or two pallets per trip.

Aluminum Cylinder Heads Formed by New Method

Furnace Brazing of Individual Permanent Molded Sections Permits Economical Production of Light Alloy Cylinder Blocks and Heads



A NEW method of making aluminum cylinder heads, cylinder blocks, and similar products difficult to produce economically by conventional casting methods has been developed by the Aluminum Co. of America's Cleveland Development Division.

In this unique process, aluminum alloys are utilized in several forms, and recent improvements in brazing alloys and techniques are adapted to hold the finished sandwich-like product together. This unique method of joining aluminum alloys has resulted in a proved means of producing a variety of parts which formerly called for intricate sand cores in fabrication, but

(Upper Left)—Four sectional slices of an aluminum cylinder head after being cast by the permanent mold process. The lower section of the illustration shows the stamped aluminum braze gaskets which are placed between the sectional slices.

(Left)—Aluminum cylinder head slices and aluminum filler metal gaskets in proper alignment and ready for the furnace braze operation.

By Frank Jardine

Manager
Cleveland Development Division
Aluminum Co. of America

which now can be produced by a combination permanent mold-furnace brazing process.

Aluminum cylinder heads can be cast by the permanent mold process in two or more integral sections, with the sections or slices being furnace brazed together for final assembly. The standard design of an ordinary cylinder head must be altered slightly to permit the individual sectional casting of each slice. The permanent mold casting process, which is well-suited to mass production techniques, eliminates the necessity of cores normally employed during the production of a one-piece, semi-permanent mold or sand cast product. With the permanent mold process, there is no sand to knock out and there are no core wires to be removed or accidentally left in the casting. An additional feature of the process is that wall thicknesses are uniform throughout the cylinder head, since

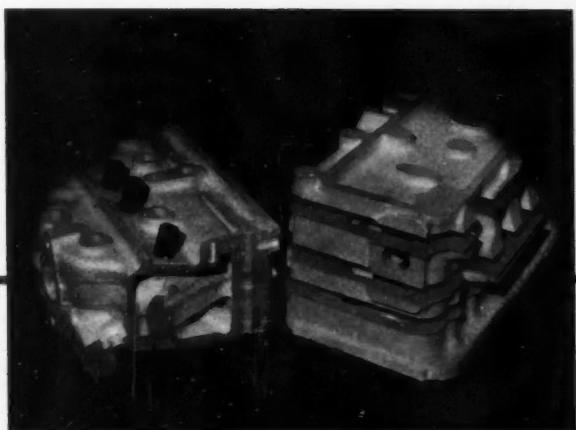
the possibility of core shift is completely eliminated.

Water and fuel passages in such parts as cylinder heads, intake manifolds, and cylinder blocks produced by this combination process are operationally smooth and require no final machining.

The sectional slices of the aluminum cylinder head illustrated here were cast in C612 alloy—a high strength, non-heat treatable aluminum permanent mold casting alloy. In addition to its strength advantages, C612 alloy has excellent brazing characteristics, good resistance to corrosion, and a relatively high melting range of 1120-1190 F. Any loss of strength resulting from the annealing effect of the brazing operation on the alloy is restored in about one week at room temperature. The chemical composition limits and the mechanical properties of alloy C612 are shown in the table immediately above.

Of top consideration in this process was the selection of the filler material that would be used to join the component parts of the cylinder head. Extensive testing determined the fact that a suitable brazing material in thin sheet form stamped to the outline of the exposed joining surfaces of each cast section would be ideal for most automotive applications of this nature. The material

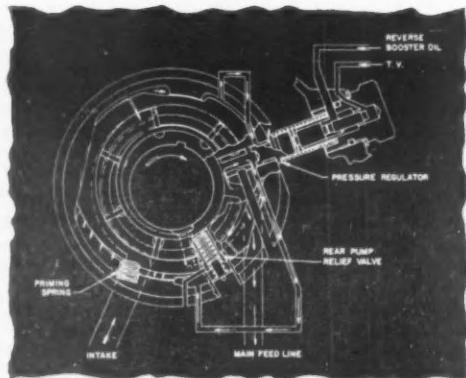
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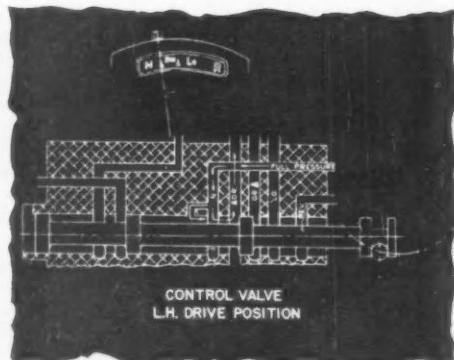
(Left)—Section of the aluminum cylinder head as it appears after the brazing operation and slightly exploded view of the aluminum cylinder head slices and the aluminum filler metal gaskets before making the proper alignment for furnace brazing.

New Features of Dual-Range

In connection with the announcement of its 1952 models, Pontiac Motor Div., GMC, has released the details of the changes made in the Hydra-Matic transmission to provide the Dual-Range Hydra-Matic drive offered on the new models. Basically the drive is the same as before from the standpoint of major mechanical features. Conversion to dual-range performance, however, has required a new front pump.



Arrangement of the new H-M front pump, showing the slide in "up" position for delivering maximum output. In this position the priming spring is acting to hold the slide up.



This schematic illustration shows position of the control valve when selector lever is in the high-range "Dr" location.

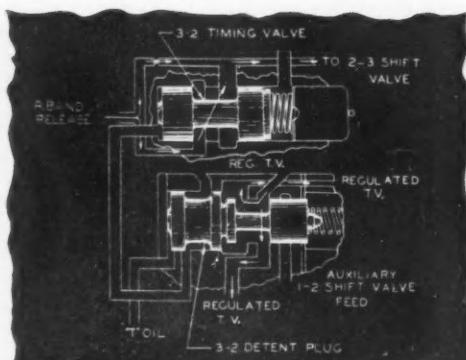
changes in the control valving, and redesign of front and rear servo units.

The new front pump, of vane type, consists of the pump body, cover, slide rotor, seven vanes, two guide rings, and priming spring. Designed to regulate its output according to the requirements of the hydraulic system, output is determined by the position of the slide. When the slide is up, the pump delivers maximum output; when centered, output is zero; when the slide is down, the pump acts as a relief valve for the rear pump.

The pump rotor turns with the engine and the priming spring serves to keep the slide in upward position at the start. A pressure regulator valve spring holds the valve in until the hydraulic system comes up to operating pressure. This allows the valve to meter oil to the lower control chamber and thus keeps the slide in the up position.

When optimum operating pressure is attained, the pressure regulator valve moves out against the combined spring and throttle pressure to the "out" position and thus permits pump pressure to be directed to the upper control chamber. At the same time pressure in the lower chamber is allowed to exhaust around the pressure regulator valve. These conditions force the slide to move down and thereby reduce pump output. As the slide moves down it uncovers a port, permitting oil pressure to flow to the fluid coupling and to supply lubrication to the assembly.

Since the front pump supplies the proper amount of oil to the system while it is running, the front



Until the accelerator is depressed through the detent, the 3-2 detent plug remains closed while the 3-2 timing valve is open.

Hydra-Matic Transmission

pump relief valve has no effect on the operation of the pump. Its primary function is to relieve excessive output of the rear pump under special conditions such as encountered in towing the car when the front pump is inoperative.

Control valving has undergone some significant changes to provide dual-range operation. Full throttle downshift now is provided with set speed ranges regardless of the position of the selector lever. Most important change is the introduction of the 3-2 timing valve and the throttle regulator valve. The 3-2 timing valve is employed to delay application of the rear band on a 3-2 forced downshift, to effect smoother shifts. The throttle regulator valve is controlled both by throttle valve pressure and spring force.

In operation, the 3-2 detent plug remains closed until the accelerator is depressed through the detent, the 3-2 timing valve being opened at this point. While the 3-2 detent plug remains closed, regulated throttle valve pressure flows through it to act on regulator plugs and shifter valves to assist in delaying the shift. Because the 3-2 timing valve is open, main line pressure flows freely during 2-3 upshifts and 3-2 downshifts.

However, when the accelerator is depressed through the detent with the car moving slowly enough to obtain a 3-2 shift, main line pressure from the T-valve will open the 3-2 detent plug, thus moving the 2-3 shift valve to closed position.

When the 3-2 detent plug is open, regulated throttle valve pressure to the 2-3 shifter valve is shut off. At

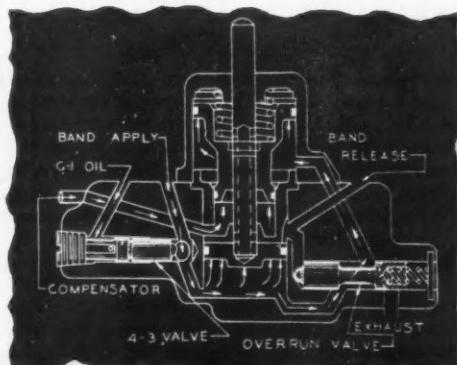
the same time main line pressure from the T-valve flows past the large end of the 3-2 detent plug to close off the 3-2 timing valve. Regulated throttle pressure then flows into a passage uncovered by the small end of the 3-2 detent plug and delivers oil to the 1-2 shift valve through a larger port to insure fast application of the front clutch.

While the 3-2 timing valve is closed, oil released from the rear servo and exhausting through the 2-3 shift valve is forced to flow through a small hole past the timing valve. This results in slow application of the rear band. Since the front clutch is applied quickly while the rear band is applied slowly, the transmission will shift smoothly into second speed.

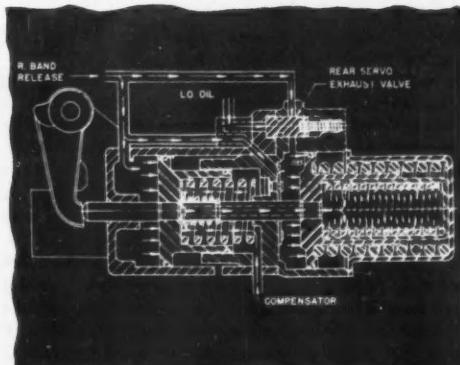
The front servo too has been redesigned to provide greater holding force to the front band under closed throttle conditions. Although this is effective under all conditions with the front band applied, the primary purpose is to assure adequate holding force with the transmission operating as a brake in third gear. To this end the front servo is arranged to utilize the front servo apply piston and includes an overrun control valve. In first, third, and reverse, the overrun control valve directs front servo apply oil behind the larger diameter apply piston.

In second or fourth gear, oil to the front clutch piston also is directed to the end of the overrun control valve, thus forcing it back against the spring. Here the valve cuts off oil supply to the servo apply piston and permits the oil trapped behind the piston to be

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Front servo control arrangement, showing overrun control valve as positioned by spring in first, third, and reverse movements.



Details of the rear servo unit which has been redesigned to allow faster rear band application in "Lo" range.

THE importance of good design has no substitute in the present day automobile. There was a time when increasing the gage or thickness of the material would answer the problem or correct the defect. Today, competition requires that each part of the automobile perform at high efficiency and at a minimum of cost. In leaf springs, the knowledge of exact operating stresses and stress patterns will point the direction to follow in engineering a well designed spring.

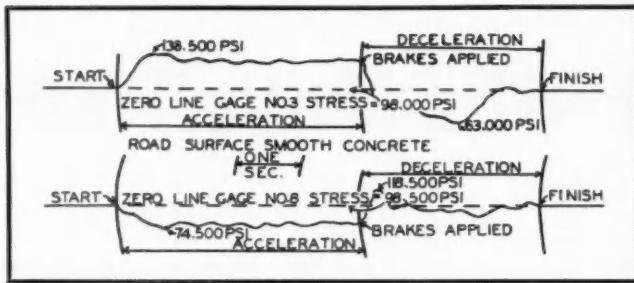


Fig. 3—Typical recordings for a gage located on the front half of the spring midway between the eye and the spring seat and a gage located on the rear half of the spring midway between the eye and the spring seat.

Modern Leaf Spring Design

By F. T. Rowland

Product and Technical Engineer,
Standard Steel Spring Co.

FORMULAE used in leaf spring design, including correction factors, although they give a basis for preliminary work, do not tell the stresses which may develop under various operating conditions. Good leaf spring design relies to a large extent on a knowledge of these stresses. Today, these stresses can be determined by the use of SR-4 type strain gages and related equipment.

Fatigue failure usually occurs in an area of localized stresses or stress concentration. The most efficient spring design would have uniform stress throughout the length and width of each leaf. This cannot be accomplished 100 per cent since the spring must have a means of attaching to the frame and to the axle seat in which areas the stress is lower than the stress in the balance of the spring. Also under bending, the cross section of the spring leaf is distorted, whereby both edge tension surfaces are fur-

ther removed from the neutral axis than the middle tension surface. Since the magnitude of the stress at any point in the cross section is in proportion to its distance from the neutral axis, the edge tension surfaces will have a higher stress than the middle tension surface.

If the spring steel section has concavity as allowed in the steel mill rolling tolerance, the stresses at the edge tension surface would be higher under load than the stress at the middle tension surface. The differential between the stresses at the edge and middle of the tension surface apparently remain the same until about 40,000 psi., which point may vary depending on width and gage of the section. Beyond this point of bending, due to distortion of the section, the

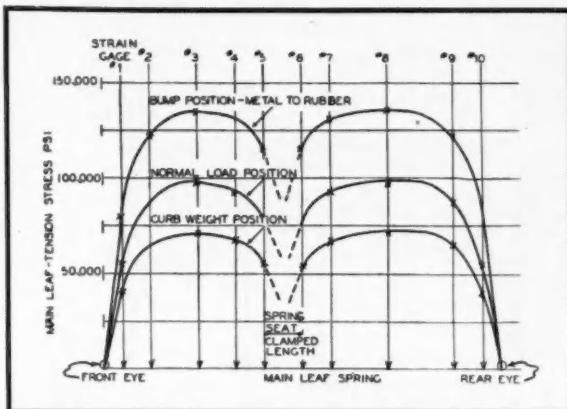


Fig. 1—Stress pattern of a main leaf spring for three loadings with the automobile stationary. The normal load includes curb weight plus the payload.

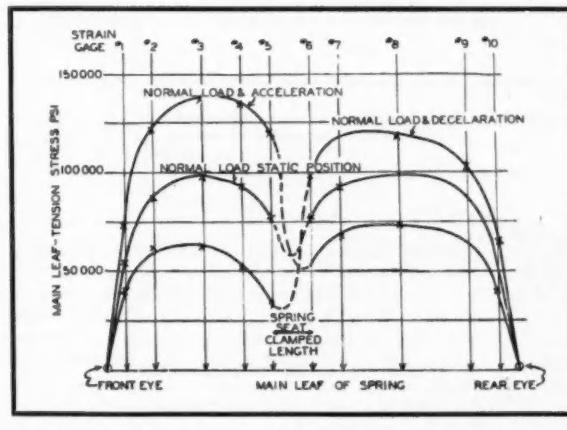


Fig. 4—Stress pattern of a main leaf spring under static plus dynamic loadings.

stress at the edge tension surfaces increases at a greater rate than the stress at the middle tension surface.

Because of these conditions, the surface or skin stress varies from eye to eye in the main leaf as shown in Fig. 1 and from one tension edge of the cross section to the other tension edge as shown in Fig. 2. The leaf spring for long fatigue life must be designed so that there are no points of stress which extend abruptly above the nominal stress for any loading. A stress pattern must follow a smooth line from eye to eye as shown in Fig. 1. Within the spring seat the stress pattern will depend on the design of the seat and whether or not insulating material is used.

With Hotchkiss drive and high powered engines of

today, the rear leaf spring must be carefully designed to absorb, without failure, the driving and braking torque. At the same time that the horsepower was increasing in engines, the demand for softer riding automobiles was the order of the day. These two conditions have advanced to the point where exacting stress analysis of leaf springs under dynamic loading is required before the design can be approved for use, or released for production with an assurance that it will meet the required performance.

Soft riding springs require a low rate. The softer springs are less able to resist torque wind up and often are overstressed under severe power application. Repeated overstressing will cause early fatigue failure or settling of the spring.

The Hotchkiss drive principle will permit the leaf springs to absorb much of any sudden application of

power from the engine or brakes and thus ease the shock or jolt which is transmitted to the passengers. When this happens, the leaf springs wind up into a flat "S" shape and in so doing, store energy for the moment, which is released as the spring returns to normal position.

In order to reduce the possibility of overstressing due to torque application, longer springs are employed. For the same rate, the longer spring will require a greater moment of inertia which in turn gives greater strength or resistance to wind up.

In the longer springs, for equivalent stress, the leaves can be of heavier gage, which increases the mechanical strength of the main leaf eyes. These advantages can be obtained with little or no increase in

the weight of the spring. Several makes of automobiles have adopted the longer springs in their 1951 models.

SR-4 strain gages may be used to verify calculated stresses and to establish the extent of stresses added due to torque. The strain gages are cemented to the tension surface of the main leaf. Their position will be governed by the design of the spring and may be based on peak stress areas as determined by the use of Stresscoat. For the main leaf analysis, 10 gages along the middle of the leaf will give a good coverage with possibly two additional gages near the edge, which will establish the relation between the edge and middle tension surface stresses. If it is desired, strain gages can be located on any or all of the balance of the leaves.

Readings of the strain gages can be taken for any loading of the automobile which may be desired. Fig. 1 shows a stress pattern of the main leaf for three loadings with the automobile stationary.

Dynamic stress analysis with the automobile under actual driving conditions is where strain gages have their greatest value. The gages are connected to a Brush recorder which may be assembled and operated on the rear seat of the automobile. A recording, as shown in Fig. 3, is obtained for each strain gage. Acceleration, deceleration, road conditions, right or left turns and speeds may be spotted and appropriately marked as the recording is produced.

The recordings will give the extent of the stresses under the various driving and road conditions. In Fig. 3 typical recordings are shown for a gage located on the front half of the spring midway between the eye and the spring seat and a gage located on the rear half of the spring midway between the eye and the spring seat. The zero line for each gage represents the stress (while the automobile is stationary) at the position of the gage on the spring leaf with the pay load the automobile carries during the test. Variations above and below the zero line are the stresses which are induced due to torque (engine or braking) and loading conditions. Stress recordings can be made over a test course and comparative spring designs evaluated.

Fig. 4 shows a stress pattern of the main leaf under static plus dynamic loadings.

From the information and data developed on comparative spring designs, a decision can be made with a high degree of confidence as to the results which will be obtained in service.

Tests of this type add materially to our knowledge; however, they do not replace the proving ground tests, but rather they give us a clearer picture in the analysis of the service tests.

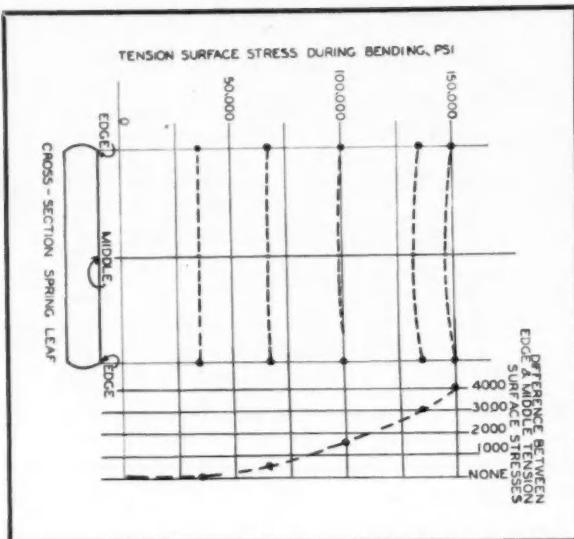


Fig. 2—Tension surface stress from one tension edge of the cross section to the other tension edge during bending.

In the analytical calculations often times the values used pyramid to the point where the final result is far from the actual condition. With a knowledge of the exact stresses as they occur, the engineer is able to recommend the correct spring design.

Since fatigue strength is the measure for determining a well designed spring, it is highly important that each part of the spring, from eye to eye of the main leaf and from end to end of each successive leaf, do its full share of the work.

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Drill Press Converted Into Brushing Machine

Saves Time for
Aircraft Manufacturer

BY converting a drill press into a high speed production brushing machine, the Propeller Division of the Curtiss-Wright Corp. is said to have saved nearly \$20,000 in equipment and considerable time getting into production on an operation vital in the manufacture of its variable-pitch propellers.

Some time ago this propeller manufacturer found it necessary to devise a method for improving the finish on a small bearing area in the hub of the variable-pitch propeller. The operation, it was found, required an expensive machine, tools and fixtures that would cost nearly \$20,000. In view of the urgent need for these propellers



The new Fairchild gage is being used to check the wall thickness of a piece of tubing that will go into one of the Flying Boxcars.

New Gage for Flying Boxcars

THE development of a precision gage to determine the exact wall thickness and concentricity of lengths of tubing by the quality control department of Fairchild Aircraft Div. typifies the resourcefulness being applied by Fairchild in producing Flying Boxcars. This unique electronic wall thickness gage was built in response to the need for a method of determining wall thicknesses of tubing up to six ft. or more in length in order to assure the maintenance of blueprint callouts and tolerances. Straight and tapering tubes can be checked with equal facility.

In several cases, the gage has been utilized to solve practical production problems and has resulted in the saving of many production manhours and quantities of material which, without a means of accurate determination of wall thickness, would have had to be scrapped. The gage consists of an arrangement of two horizontal arms mounted on a base. Wiring attaches contact points on the arms to an electronic 100-v con-

trol box with transformer, amplifier, relay and light for visual and horn for audio indication.

In operation, the test specimen is slipped over the lower arm of the gage and cradled on vee blocks. A screw adjustment permits zeroing the arm until a contact point touches the inside wall of the tubing. A vernier depth micrometer, resting on the end of the upper arm, is screwed down until it touches the outer surface of the test tubing.

While an electric current is sent through the arms, completing the circuit at the contact points, two readings of the vernier are taken, one with the tubing in place, the second with it removed and the vernier touching the lower contact point. The difference in the two readings is actual wall thickness, accurate to 0.001 in. The gage not only measures the wall thickness of tubing at any given point, but can be used to determine the concentricity of outer and inner surfaces.

in this period of defense production, this high cost was secondary. What was more important was the length of time it would require to put this machine into operation.

With the help of power brushing specialists from the Osborn Manufacturing Co., Curtiss-Wright engineers worked out a method for removing the particles of fragmented metal and smoothing peaks left on the diameter of a shot-peened hub bearing area.

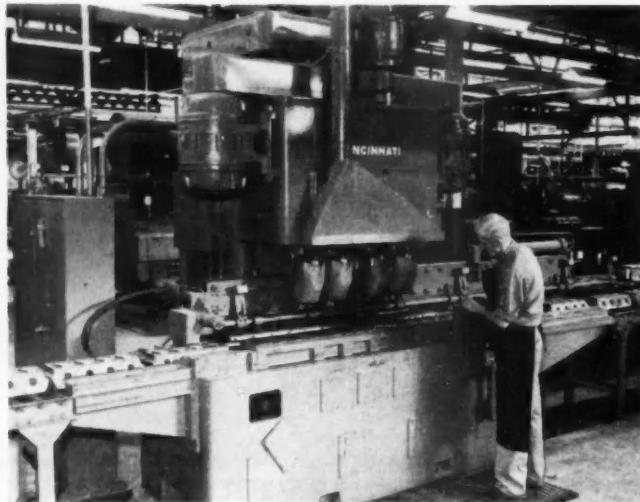
An Osborn wire brush was mounted on a drill press equipped with an air operated ram and timer. The propeller hub is placed in a holder on the drill press. After the machine is actuated, the automatic timer runs

the brush through the cycle. The brush is lowered into the hub to the depth necessary to contact the bearing surface. The pause at this point is predetermined to properly brush the shot-peened area. As the brush is lowered and raised, it also cleans the threaded portion of the hub.

Speed of the brush is 900 rpm. Various diameters of brushes are used to suit the different hub sizes. Power brushes are particularly suited for this operation because of the nature of the propeller hub.

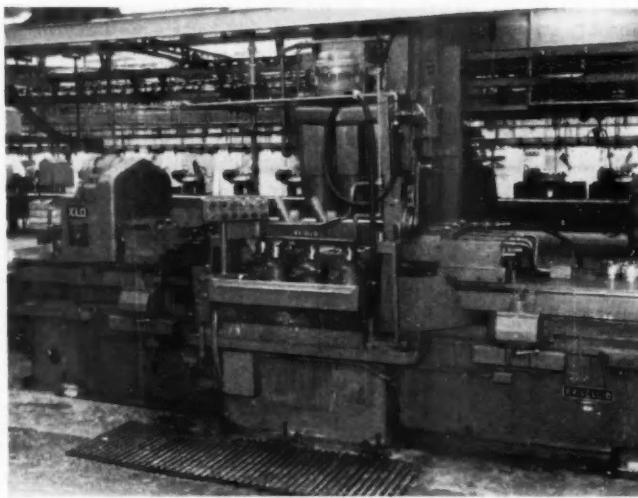
A highly superior finished product is said to result. Perhaps more important, there was no wait for machinery and production was made possible at once.

De Soto's Self-Contained



Special Cincinnati four-head machine for milling contoured hemispherical combustion chambers in cylinder heads.

Here is a front view of the unique machine designed to cam-turn the elliptical piston skirt; and precision-bore the piston pin hole in two operations. Cam-turning is done with the vertical heads in the background; precision-boring—rough-bore and finish-bore—is done with the horizontal heads on the left and right. The entire operation is fully automatic.



By Joseph Geschelin

STARTING with an entirely new V-8 engine and given the go ahead for setting up complete manufacturing facilities, the production department of De Soto Division of Chrysler Corp. was relatively free to study the latest methods and equipment known to the art. The final result, evident even on casual inspection, is a magnificent self-contained engine plant, featuring the most advanced methods to be found in the industry.

One of the minor handicaps encountered in setting up this operation was the fact that it was to be housed in an old plant—another section of the huge plant used for producing De Soto bodies. An outstanding job of rehabilitating the old structure has been done. A dynamic color scheme and excellent lighting have combined to produce both modernity and a fine place in which to work.

This is one operation that defies highlighting and condensation. Practically everything is new and many machines and processes are unique and noteworthy. Consequently, this article is intended only as a sort of news summary to be followed later by more detailed studies of selected operations.

Consider first the cylinder block and head. The rough castings are first shot-blasted in a new cleaning machine with a rotary table, then routed to their respective machine lines. Instead of using surface broaching equipment on the

Production Setup for V-8 Engines

block, De Soto has installed an interesting transfer machine for handling the initial milling operations, followed by a succession of transfer machines of familiar makes. Incidentally, the design of these transfer machines embodies the latest developments. Literally these machines think as well as act. Many of them contain an inspection station in which certain critical holes or dimensions are gaged automatically and either accepted or rejected without operator attention. Not only does this procedure reduce spoiled work but it also prevents serious damage to spindles on succeeding machines.

One of the interesting features of this line is the battery of three machines for rough, semi-finish and finish honing. Each one is of V-type with a single hone for each bank. Thus each machine takes two bores at a time, each block being indexed four times to complete the honing operation.

Cylinder heads are surface broached, at the start of the transfer machine line, in one of the Cincinnati surface broaching machines of three station-type. The first operation does the broaching of one face and side, then the head is transferred to the center station fixture for roll-over, presenting the other face and side for broaching. The enormous broaching ram is fitted with individual tools of solid cemented carbide.

Perhaps one of the most noteworthy transfer machines on this line is the long Heald Bore - Matic precision - boring machine setup which handles valve seat machining, among other operations. At one of the stations the machine has been fitted with an automatic means for feeding valve seat inserts directly from the refrigeration cabinet mounted above the line.

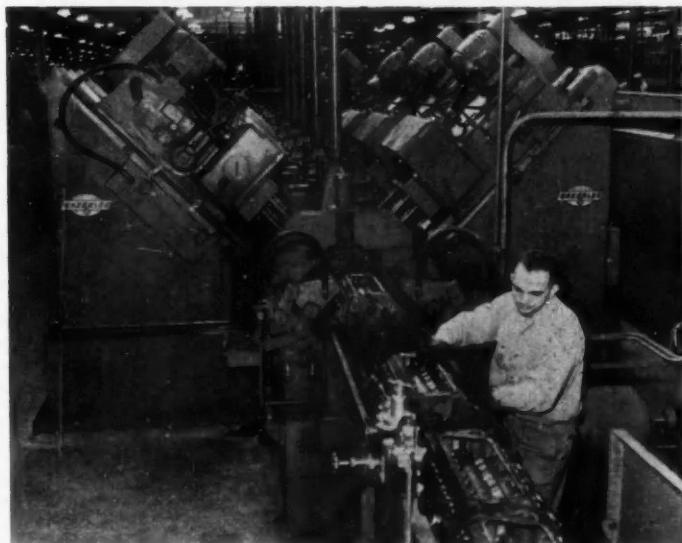
The chilled inserts are fed automatically and pressed in without operator attention.

From a design standpoint, a feature of De Soto cylinder heads is the hemispherical combustion chamber. These chambers are nicely machined in a vertical four-head boring machine of special type. Because of the close spacing of combustion chambers, the machine takes two heads at a time and finishes two chambers at a time in each head, completing two heads in two cycles.

The intake manifold for this engine is a complex, casting which might be quite awkward to handle by conventional methods. At De Soto it is machined completely and automatically in two machines. The first operation handled in a large Cincinnati surface broaching machine, does the broaching of the two banks of port faces. The manifold then enters the transfer Snyder machine which completes all drilling and tapping operations.

(Turn, please)

Perspective view of one of the long transfer machines on the cylinder block line.





Another view in the DeSoto plant. This is the Snyder transfer machine designed for drilling all oil holes in V-8 engine crankshafts.

A distinctive feature of crankshaft machining is that the main bearing line—five bearings—is first turned, then rough-ground before any work is done on the pins. According to De Soto this provides the most advantageous conditions for finishing the shaft since pin turning now is accurately located from the ground bearing surfaces. The big hydraulic grinders

Latest version of the Pratt & Whitney electronic type air gaging machine seen here checks most dimensions on connecting rod and cap assembly.



for main line bearings have six wheels in operation simultaneously, since the rear bearing has two different diameters spaced about a central oil slinger.

Time was that crankshaft oil drilling was a lengthy procedure, requiring the transfer of shafts through a succession of sensitive drilling machines. The De Soto crankshaft is oil-drilled completely and automatically in a Snyder transfer machine of advanced design. The machine has a total of 32 heads, and not only drills all oil holes but also drills the large diameter lightening holes from both ends.

While on the subject of crankshafts, it may be noted that dynamic balancing is done in a new setup of outstanding character. As illustrated, it consists of two dynamic balancing machines, and does the

balancing in two distinct stages. The first stage may be termed semi-balance. Here the shaft is rough-balanced and upon completion of balance readings to determine the amount and location of unbalance, the work is transferred automatically into a large drilling unit mounted to the right of the balancing machine. Balance drilling then is done automatically.

The same overhead conveyor then removes the shaft from the drill station and deposits it on the inclined shuttle-type conveyor which connects the two balancing units. This conveyor, in turn, transports the shaft to the second balancing machine. Here the shaft is given its final precision balance with corrective drilling at the second station. This two-station operation produces nicely balanced work, held automatically to limits of $\frac{1}{2}$ -oz in.

The plant boasts an outstanding piston machine line, one of the unique pieces of equipment being a special single-purpose machine for turning the skirt and precision-boring the pin holes in the same setting. It may be noted that in this case the elliptical skirt is cam-turned rather than cam-ground. Cam-turning is done at the vertical station which is fitted with three inclined cam-turning heads. Pin bores are rough-bored in the precision-boring station at the right; then finish-bored at the station on the left. This station also cuts the lock ring groove in the counterbore.

This machine, as illustrated, has a four-station rotary indexing table, with three pistons to each station. Thus three

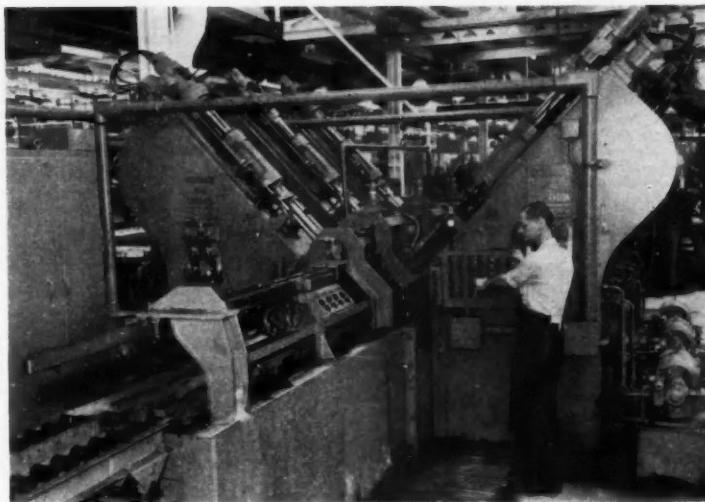
Close-up of Micromatic V-type honing machine setup for cylinder bores.

stations are in operation while the fourth is used for loading.

Another item of interest is a new Morris piston weighing machine. It has a rough-weighing station in which pistons are weighed to make sure they are within limits. At this point, light pistons are rejected. Accepted pistons then go through the machine, are weighed, then milled on the lower bosses to standard weight.

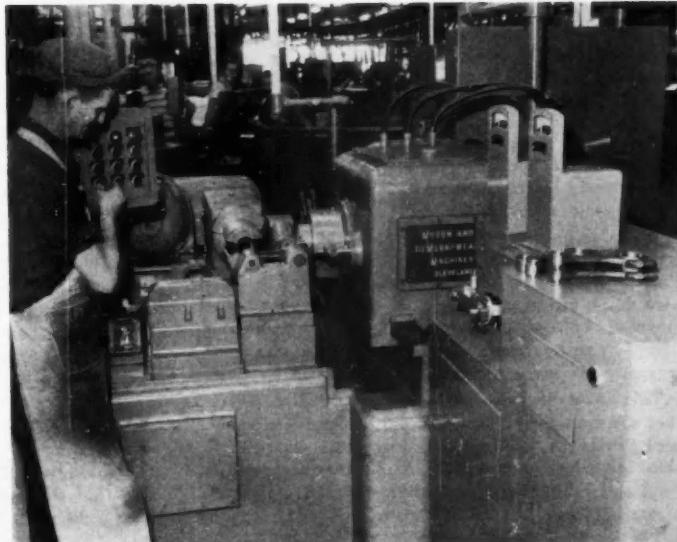
Balancing of connecting rods also has been organized in two stages. Here there are two different machines for the purpose. The first machine balances the small end to rough limits by profiling part way around the upper end of the forging. Then the rod goes to the finish-balance machine where both ends are weighed. Final balance on the small end is done by hollow milling one face. Balance of the big end is done by milling across the weight boss on the lower end of the bearing cap.

Although automatic equipment of most advanced type has been provided to assure the most favorable cost levels, quality control has been placed on an extremely high plane. Here will be found some of the latest types of electronic air gages as well as Sheffield Precisionaire air gages. A Pratt & Whitney electronic type air gage, provided for connecting rod inspection, checks both bores, runout of the face with respect to the bore, also the center distance, all simultaneously.

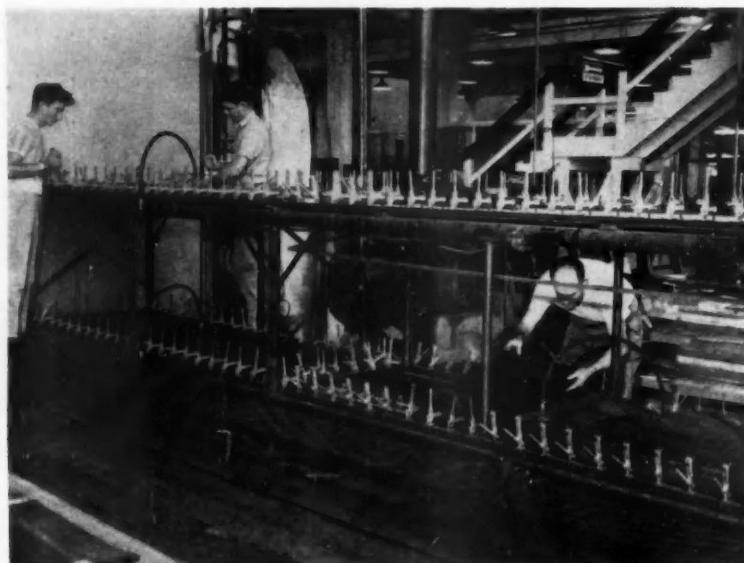


The timing case cover casting is another of the parts given special treatment. Here is a neat problem of holding the cost of machining within the cost of the conventional stamped cover. Again the operation is handled in two major automatic stages. First operation is surface broaching in one of the big Cincinnati broaching machines. The broaching tool, of concave form, machines the rounded end of the case, as well as two flanges, in one pass.

(Turn, please)



This is the final Match & Merryweather weight-balance machine for connecting rod and cap assembly. One side of the small end is hollow-milled at the station in the center, while the weight boss on the cap is milled by means of the cutter at the right.



This illustration shows the placing of a rubber blanket over a Metlbond assembly at Consolidated Vultee Aircraft Corp.

Metlbond Process for With

*Utilization of Organic Materials in Thin Glue-Line Form Permits
the Attainment of Joints Equal, or Superior, in Strength to the
Materials Joined*

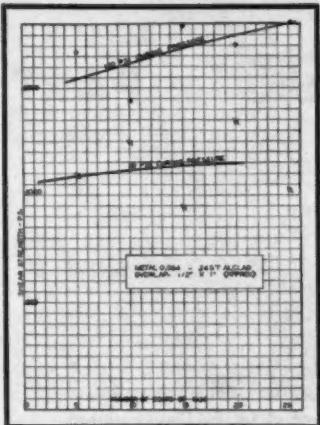
VAST development in the field of high polymer adhesives has been made in the last five years, together with an accumulation of data relative to mass production employment of these materials in metal fabrication.

Increased cognizance of organic materials and their applications in the field of adhesives has even necessitated modifications to certain terms previously accepted as standards. For example, prior to World War II, the word "bonding" was applied generally to methods employed in the joining of cellulosic materials with animal and vegetable glues. Due to pioneering work, largely by the aircraft industry, the word "bonding" now has become synonymous with the joining of metals, solid organic plastics, and natural and synthetic rubbers.

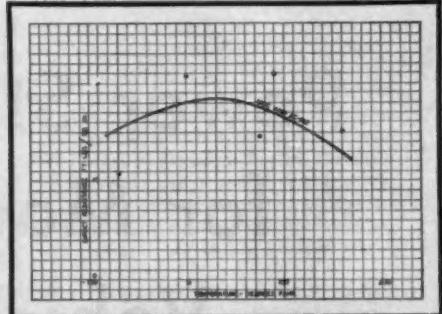
Weight is a premium and stresses are high in modern, high speed aircraft. The assembly of light weight metal components must be such that stress distribution is as uniform as possible throughout the bonded

areas. The utilization of organic materials in thin glue-line form is enabling industry to approach this desired condition by minimizing stress concentrations normally associated with riveted and/or spot welded joints. Such glue lines will, in many cases, permit the attainment of joints which are equal, and on some occasions superior, in strength to the materials being joined. Further, these glue lines can be designed so that resistance to all environmental influences experienced over the life of the specific application will be achieved.

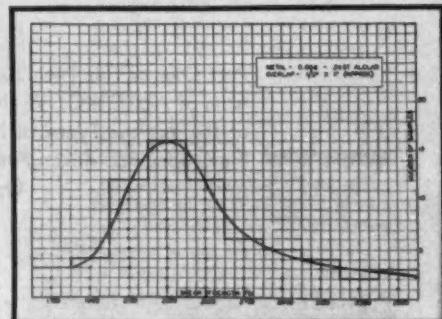
Three of the largest aircraft companies in the United States are currently employing the Metlbond process, while several others are actively investigating the possibilities of its adoption as a solution to their problems of joining aluminum and magnesium components. Still—to Metlbond or not remains a problem confronting many members of the general metal fabricating industry. In spite of growing recognition and



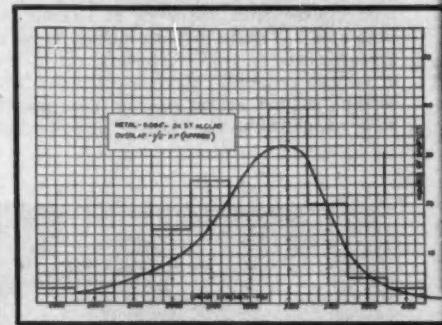
M3C-N2 combination—shear strength of 75 F. vs. thickness of M3C layers.



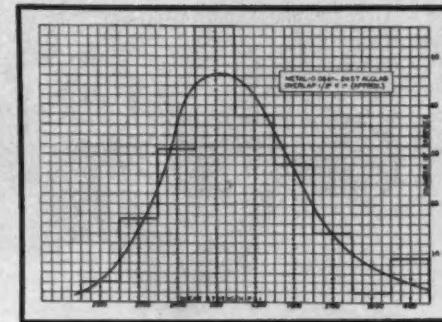
Impact vs. temperature.—M3C and M3C-N2.



M3C-N2 combination—shear strength at 75 F.
Cured at 10 psi and 330 F.



M3C-N2 combination—shear strength at 75 F.
Cured at 100 psi and 330 F.



M3C shear strength at 75 F. Cured at 100 psi
and 330 F.

Joining Metal Adhesives

By Dr. G. G. Havens and E. P. Carmichael

acknowledged success of the process, a reluctance remains, undoubtedly because of the erroneous belief that extremely complicated procedures are required to assure consistently high quality bonds. To resolve these doubts, answers to the following questions must be available: What is the Metlbonding process? Of what is it capable? What advantages does it possess over present processes?

Metbond development began with the assumption that, due to irregularities, metal faying surfaces would not be perfectly matched. It was evident that with such irregularities a single phase material in the glue line would be subjected necessarily to stress concentrations, resulting in premature failures. Consideration was given to the filling of these irregularities with a strong, rigid resin prior to bonding. This, however, was found to be cumbersome and impractical from a production standpoint. Experiments indicated that a

(Turn to page 102, please)

Power Steering for Modern Vehicles

PART
II

By Edmund B. Neil

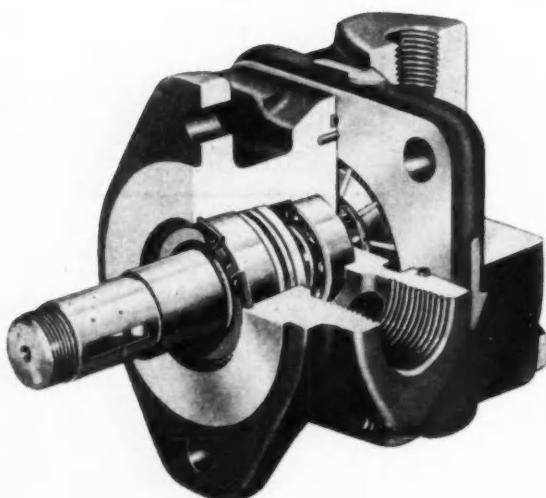
Part One of This Two-Part Article, Which Appeared in the December 1 Issue of AUTOMOTIVE INDUSTRIES, Was Devoted to the Development of the Various Types of Power-Assisted Steering Gears. In this Second Part, Specific Makes Are Described and Illustrated, and Principles of Operation Are Explained.

STUDY of the various developments and patent art in the field of power steering during the past twenty years discloses that most of the current successful types of power steering mechanisms have been evolved from the work of Francis W. Davis. Both open and closed systems, various forms of valves, arrangements of power cylinders, etc., for all types of vehicles underwent development under Davis' sponsorship, so that among steering gear manufacturers he is recognized as the "father" of power steering as

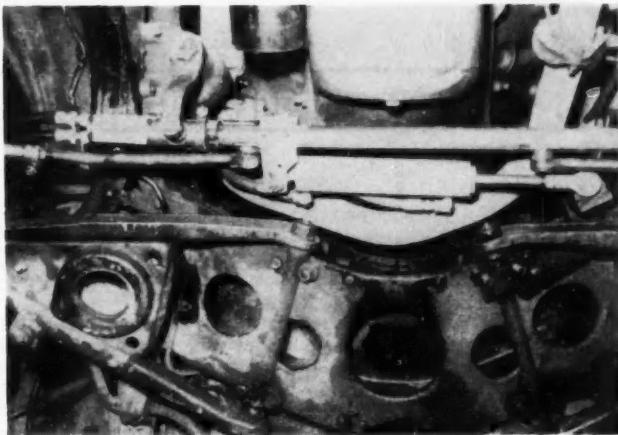
used today. It is quite possible that without his persistence over the years, the present advanced state of power steering mechanisms now in use and undergoing further development would not have been attained.

Much of Davis' work and that of companies furthering his efforts relates to the methods used to obtain the desired signal input and accompanying servo response. The type of valving used, and the means of obtaining the signal, while always retaining the necessary steering feel and self-return or reaction effect of the wheels, therefore are the critical factors in a power steering system.

Three methods of obtaining the signal are currently employed: (1) A slight endplay or looseness is permitted between the drag-link and pitman arm, or between the link and steering knuckle arm, as in the Garrison and Vickers units described later; (2) side movement of a part of the steering column caused a "climbing" tendency of a pair of gears introduced between the top and lower parts of the column, as in the new



Cutaway view of Vickers van type hydraulic pump. Series V-200, for use with Vickers steering booster and for other hydraulic power applications. Maximum continuous-duty rating of the pump is 1000 psi. Pumps are available in four capacities.



Experimental Garrison installation on 1950 Oldsmobile 98. Valve is mounted at pitman arm ball. Standard steering gear is retained.

Chrysler Hydraguide gear; and (3) slight end-play in the steering column shaft as in the Bendix, Ross, and Saginaw gears. In all cases the amount of play or lash is extremely small, in the range of several thousandths of an inch.

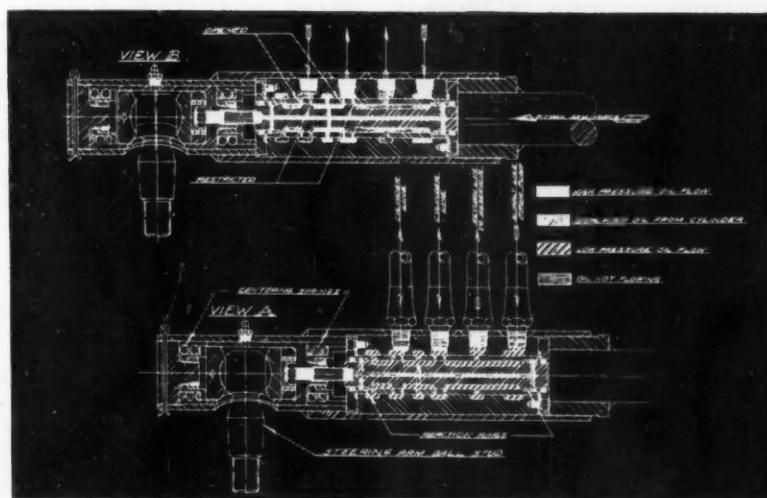
A second and important classification of power steering systems is related to the so-called "reaction effect" afforded by the valve. If there is no reaction effect the driver has no feel of the steering action. The reaction effect must produce this feel while pro-

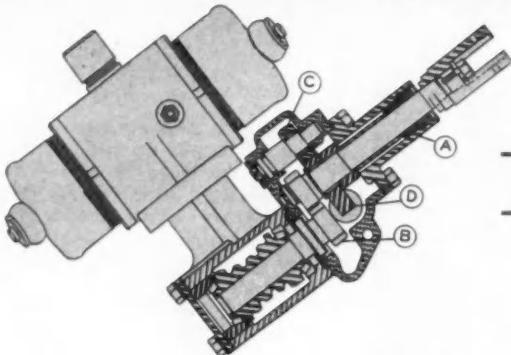
viding the necessary servo action, or follow-up in the hydraulic system. Too low a reaction effect creates the sensation that the driver does not have complete control of steering. In fact, this condition can occur if the steering wheel force is made too low, so the driver must pull the steering wheel back to the straight ahead position.

To obtain some reaction effect most systems today utilize pre-loaded centering springs in the control valve. The valve must be forced to move a pre-determined amount against spring pressure before the power assistance is provided, by diverting the oil to the power cylinder. Thus a threshold force is assured. The loading on the valve may be changed by using compression springs of various free lengths and wire sizes, etc. Adjustment may be provided.

In addition to a pre-loaded centering spring, and the control of oil pressure at some desired maximum, the more sensitive systems augment the reaction effect by the use of reaction plungers which are subjected to the working pressure in the servo, by connection to the oil input or "signal." The reaction effect then becomes proportional to the working pressure up to the maximum established for the hydraulic system. As mentioned in Part I, the system may be further augmented by a constant flow or unloader valve to assure the desired rate of follow-

Section drawings. Garrison steering booster valve. Slight backlash in ball joint actuates spool valve located inside of drag link. View "A" shows valve in neutral position. View "B" shows it in position for left turn. Both views show centering springs and reaction rings.





Longitudinal section through the Gemmer Hydroguide power steering gear. (A) Spherical bearing; (B) spur gear; (C) roller; (D) valve operating block.



Phantom view of in-line concentric type Bendix steering gear. Gears of this type have been in use on buses for approximately five years. Main gear housing serves as the power cylinder, with valve located in a sub-assembly above the housing.



Phantom view of Ross P720 Cam & Lever power steering gear. Valve is contained in flanged housing attached to lower end of column shaft. Double-acting power cylinder is mounted above column.

Power Steering—(Continued)

up regardless of engine speed. A check or by-pass valve may also be used if necessary to assure complete manual control of steering, should the system become damaged or power be lost by engine stoppage.

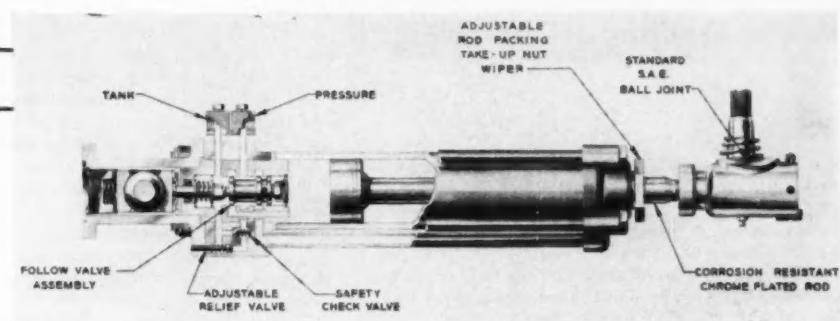
Since front axle loads, tire sizes and steering gear characteristics vary widely for different applications of power steering mechanisms, manufacturers of power steering devices for application to existing vehicles insist upon receiving complete details relative to possible installations before recommending suitable cylinder sizes and pump capacities, as well as valve spring loads. Obviously, where the steering gear also includes the servo mechanism and cylinder, the installation must be engineered into the truck or car by the manufacturer. In both cases, however, power gear manufacturers point out that with power steering, the stresses on some of the gear components are reduced, thereby offering the vehicle manufacturer the attractive possibility of reducing the proportions of these components without in any way decreasing their safety and reliability.

Garrison Steering Booster

The Garrison Manufacturing Co., Los Angeles, has been marketing a hydraulic steering booster for the past 12 years on motor trucks, fire apparatus, wheel-type tractors and motor graders, and is understood recently to have made a limited number of passenger car installations.

On most motor trucks the control valve is mounted in the drag link. The power cylinder is of double-acting type, with one end attached to the front axle and the other to the cross tie rod. Flexible rubber hoses connect the two units, while additional hoses circulate oil from pump and reservoir to and from the control valve. On the experimental Oldsmobile installation shown herein, the valve is attached to the ball joint of the pitman arm on an extension of the drag link or cross-steering rod. One end of the power cylinder is also attached thereto, while the other end is attached to the A-bar section of the chassis frame.

The control valve is of the spool type with centering springs and two reaction rings. The servo action is introduced whenever a force tends to either shorten or lengthen the drag link, as applied by the driver, or received from the wheels of the vehicle. The spool valve is then shifted endwise, directing the oil to one or the other end of the power cylinder. Until



Schematic view of Vickers steering booster. Valve is integral with power cylinder. The valve follows slight changes in position of the ball joint sockets directing the oil to one or the other end of the power cylinder. An adjustable relief valve permits setting the oil pressure at desired maximum. A safety valve allows the steering gear to be operated manually. The Booster is available in three sizes to meet various steering requirements.

the shifting occurs, the oil flows continuously through the pump and valves, as with other types of power steering assemblies.

The valve is set at 600 to 800 psi on heavy vehicles, and 500 to 600 psi on lighter vehicles and tractors. Installations for passenger cars include a flow control or unloader valve. Steering wheel rim pull for passenger cars reaches a maximum of eight to 10 lb, as for dry parking. A three lb pull is required before the control valve is actuated.

Vickers Power Steering System

In the Vickers unit a small amount of movement between the pitman arm ball and drag link, as in some of the Garrison installations, is used to operate the control valve. However, in this case the valve and power cylinder are combined in a single assembly. The cylinder is of double-acting type with the piston end attached to the chassis frame of the truck, while the cylinder and integral valve are connected to the drag link by means of a flexible joint. The valve itself replaces the usual drag-link ball joint.

The unit provides necessary steering force up to the maximum which the oil pressure can exert against the power cylinder piston. A light centering spring is used, but the valve design does not include any additional means of obtaining

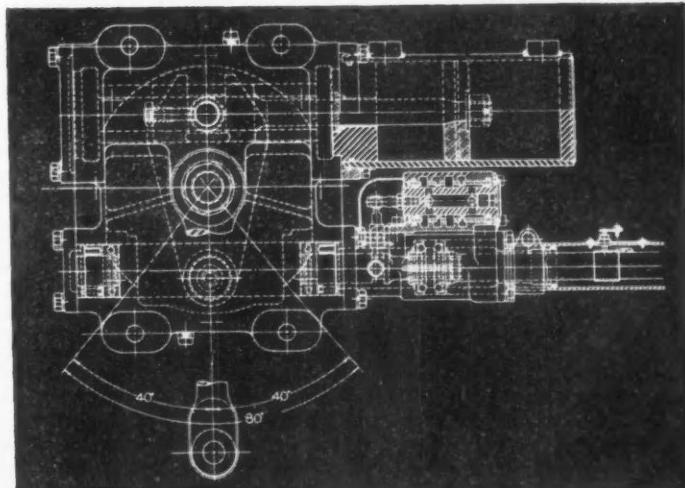
the reaction effect. The only effort required of the driver is to overcome the frictional resistance of the steering linkage and gear, plus that of the spring, up to the maximum force afforded by the booster.

Oil is supplied by a Vickers vane-type pump which provides a pressure up to 1000 psi. Automatic overload protection is obtained by means of an integral relief valve. A safety check valve permits free circulation of oil between both ends of the cylinder so that manual operation is always available.

Gemmer Hydraguide

Since the Gemmer power steering assembly used on

Hydрапоуеr HP70 steering gear recently brought out by Ross. Movement of the valve is multiplied by the lever which actuates it, thus permitting a more compact valve design.



Power Steering—(Continued)

some Chrysler models was recently described (AUTOMOTIVE INDUSTRIES, Feb. 1, 1951), extensive details are not repeated here. This assembly utilizes a lightly loaded centering spring, and has a pair of reaction plungers mounted above two control plungers. The four plungers are mounted on the two sides of a valve operating block mounted on the lower end of the steering column. The servo-signal results from a side shifting of the steering column shaft. The column shaft is split above the worm of the steering gear and a pair of spur gears with eliptoid teeth is interposed between column and worm. A spherical bearing permits the lateral movement necessary for actuation of the plungers. The lateral movement occurs when the spur gears are prevented from separating when the steering wheel is turned. Separation is prevented by means of a back-up roller. The amount of lateral movement sufficient to start actuation is understood to be about 0.003 in. The control or "distributor" valve plungers must be fully displaced before movement of the reaction plungers occurs. Two single-acting pistons apply the actuating force to a lever attached to the pitman arm shaft within the steering gear assembly. The assembly also includes a maximum pressure relief valve and an unloader valve. Several rubber mountings are used and a flexible rubber coupling is mounted in the column shaft to minimize noise transmission. A reserve tank is mounted above the oil pump. Recommended oil is 10W.

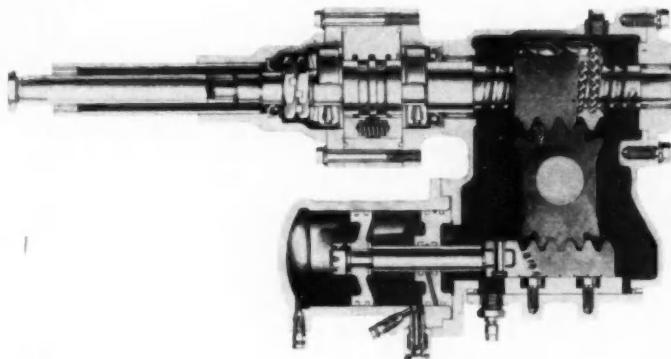
Bendix, Ross P720 and HP70 and Saginaw Gears

The valves used in the Bendix, Ross P720 and the Saginaw power steering gears are all of the same basic design. They are mounted on the end of the steering column shaft, and are integral with the gear housing. All are of the pre-loaded centering spring type with reaction plungers surrounding the valve proper. The system includes relief and unloader or constant flow control valves. Actuation is by slight end movement (approximately 0.004 in.) of the steering column shaft. The valve, which is of Davis type, has been previously

described in AUTOMOTIVE INDUSTRIES, when the Bendix power steering gear was announced, so is not further detailed herein. (See AUTOMOTIVE INDUSTRIES, May 1, 1949.)

To date installations of Bendix and Ross gears have been confined to motor trucks, buses, and possibly military vehicles, except for experimental installations on passenger cars. In addition to such installations, Saginaw gears have been under development for passenger cars for some fifteen years.

Each company utilizes its own particular type of steering mechanism, as in conventional gears made by these firms. The power cylinder is either attached to, or is part of the gear housing. The piston rod is attached to a lever extending from the pitman arm shaft. Connecting lines from valve to cylinder are thus short and direct, minimizing lag and any unde-



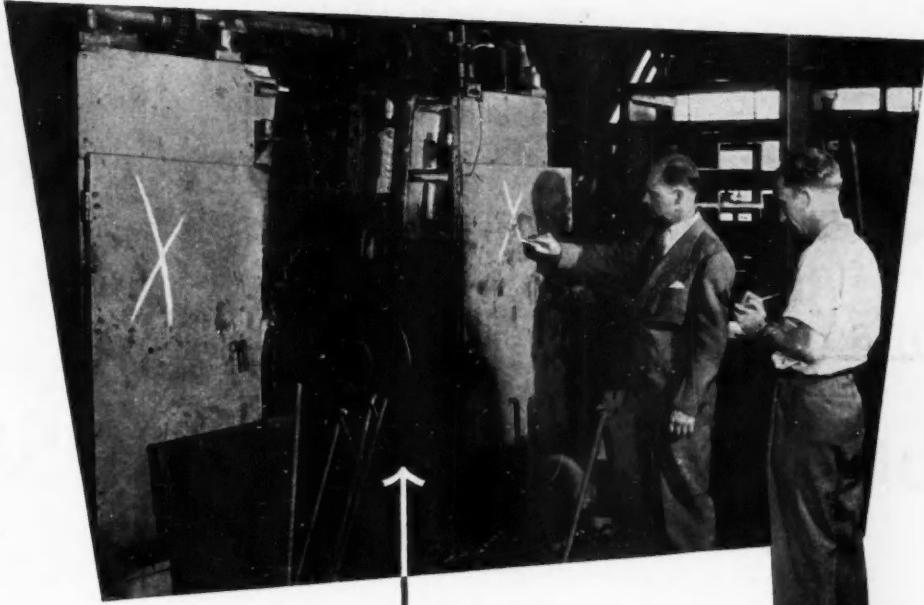
Sectional view of Saginaw truck and bus type gear. In this gear the valve is located on the column shaft above the worm. Power cylinder piston applies thrust to pitman arm shaft by means of a rack and sector. Torque output of this gear is 4000 lb ft at 1000 psi.

sirable oscillatory effects due to line expansion or compressibility of the fluid.

Ross is now producing its new Hydrapower HP70 steering gear. (See AUTOMOTIVE INDUSTRIES, Oct. 15, 1951.) In this gear the valve is mounted above the steering column shaft. The valve body is attached to the housing supporting the lower end of the steering column. The design of the gear housing permits mounting the power cylinder so that it extends either above or below the housing. The valve is actuated through a small lever, one end of which is attached to the valve spool and the other to a stud riding in a groove cut in the upper end of the steering gear cam.

The method of actuating the valve differs in principle from the Ross P720 gear in that the valve itself has no centering means, and the valve movement is multiplied by the lever which actuates it. This arrangement permits of a more compact valve design.

(Turn to page 118, please)



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6. Start it back to the steel mills by selling it to your regular scrap dealer.
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***DORMANT SCRAP** is any obsolete, broken or worn-out and irreparable machinery, tools, equipment, dies, jigs or fixtures, etc., that may encumber your premises.

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Chrysler has larger



Chrysler New Yorker for 1952.

Six-Cylinder Engine for 1952

BECAUSE of the many important new features introduced by Chrysler in its 1951 line and since requirements of the reararmament program preclude the tooling program necessary for extensive model changes, Chrysler's 1952 models feature refinements rather than radical innovations. However, special features heretofore available only in certain models have been extended to cover the entire line.

Dimensionally, all body styles are the same as corresponding models of the 1951 line, namely with wheelbases of 125½ in. for the Windsor, Windsor DeLuxe and Saratoga; 131½ in. for the New Yorker and Imperial and 145½ in. for the Crown Imperial.

The number of body styles offered by Chrysler has been reduced by eliminating those of smaller production and those that are approximated by others retained in the line. Despite this reduction, however, there remain 18 body styles. Those listed are: Windsor (6) four-door sedan, club coupe, eight-passenger sedan and Town and Country Wagon; Windsor DeLuxe (6) four-door sedan, convertible coupe and special club coupe (Newport); Saratoga (8) four-door sedan, club coupe, eight-passenger sedan and Town and Country Wagon; New Yorker (8) four-door sedan, convertible coupe and special club coupe (Newport); Imperial (8) four-door sedan and special club coupe (Newport); Crown Imperial (8) limousine and eight-passenger sedan.

All models save those in the Windsor and Windsor DeLuxe lines are powered by the 180-hp V-8 Fire-Power engine. The Windsor and Windsor DeLuxe are powered by an improved version of the Chrysler six-cylinder Spitfire engine, with horsepower stepped up to 119.

Hydraguide steering will be available also on the Windsor and Windsor DeLuxe lines, instead of only on the eight-cylinder models, as was the case in 1951.

It will be optional at extra cost, except in the Crown Imperial where it remains standard. Another feature extended all through the line is the all-electric window lift, which will be available at extra cost except on the Imperial and Crown Imperial where it is standard.

Entirely new this year, and available at extra cost on all models, is "Solex" tinted glass in windshield and all windows. This glass has the advantage of absorbing the greater part of the wave lengths of solar radiation that are not useful for visibility.

Improved performance and longer engine life for all Chrysler six-cylinder models will be achieved through a new higher-powered engine. The torque available from this engine is higher at all speeds than that obtainable in the one it supersedes. The torque curve of the new engine is much flatter at the peak and indicates an improved performance at normal driving speeds.

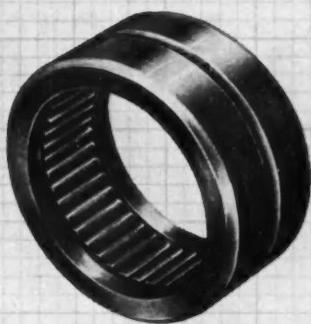
The bore remains unchanged at 3 7/16 in. but the stroke has been increased from 4 1/2 to 4 3/4 in., giving an increase in displacement from 250.6 to 264.5 cu in. The compression ratio remains at 7 to 1. With this increased displacement, the gross brake horsepower increases from 116 to 119 at 3600 rpm and the gross torque from 208 to 218 lb ft at 1600 rpm.

Longer life, improved economy and greater scuff resistance are said to result from the use of the new chromium-plated top piston rings and new wide-slot oil rings.

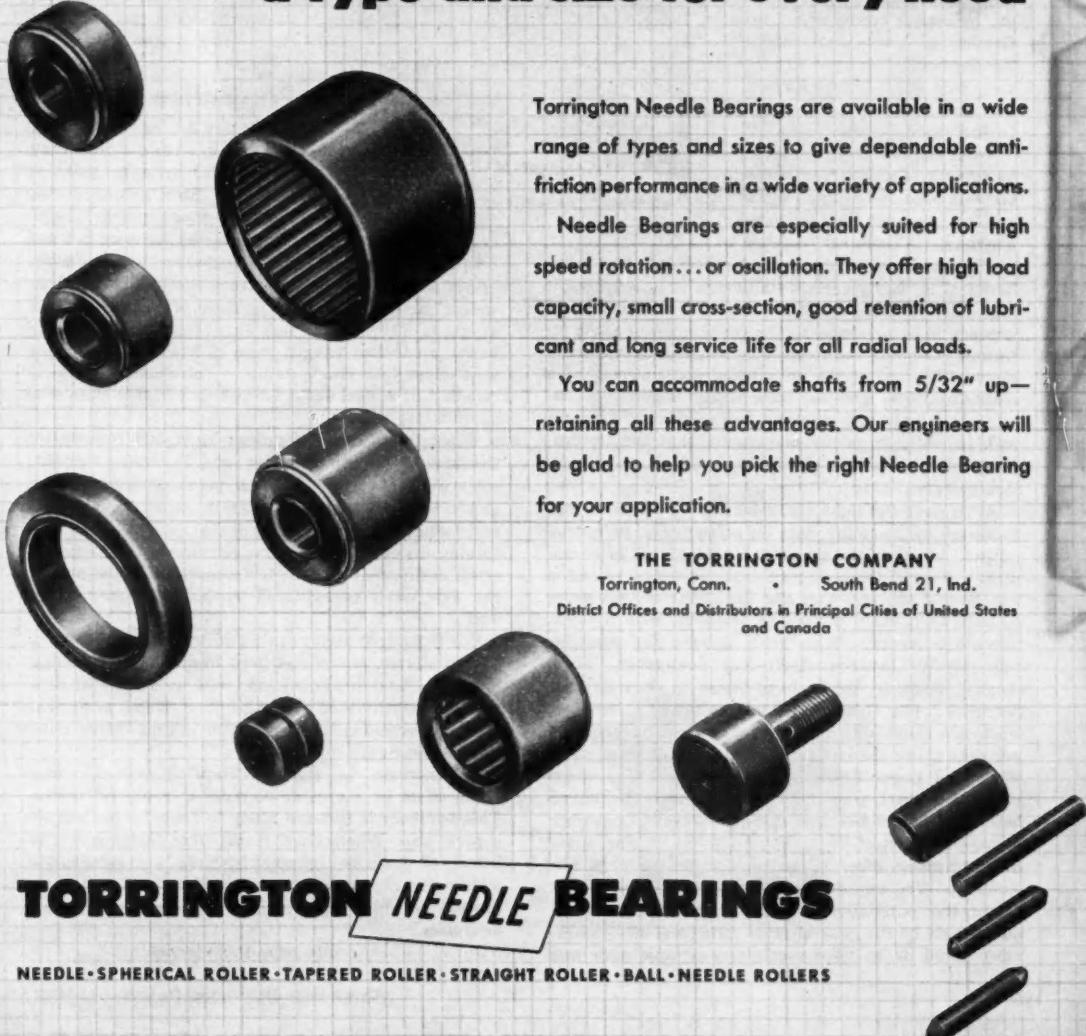
Six-cylinder models have a seven psi pressure release vent radiator cap. Less possibility of coolant loss due to boiling results from using this cap instead of the former four psi cap. This seven psi cap has been in use on Chrysler's eight-cylinder models.

A more rigid rear axle drive pinion is obtained in all 1952 models by changing the drive pinion bearing cone

(Turn to page 114, please)



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The BUSINESS PULSE

Results of a Possible Korean Truce Again a Matter of Concern in Business Quarters. Stability and Slight Upward Trend Shown During Final Quarter of Year. Next Spring Expected to Be Critical Inflation Period.

Over-all Business Activity

There is little sign that the over-all business scene has changed much since early fall. Most indicators of various kinds of activity point to only a slight upward tendency. The Federal Reserve Board's index of industrial production for October is only a little above the September figure. Incomplete data suggest that November may have brought a small further gain in production.

What may or may not occur as a result of a possible Korean truce is once again a matter of serious thought in business quarters. Continued defense production for at least a year at scheduled rates is believed to be fairly certain—although it is conceivable that delivery dates would not have the same degree of urgency as at present—and in the opinion of some informed observers the commodity markets have already discounted some of the anticipated consequences of a cease-fire. The greatest uncertainty apparently centers about consumer reactions to an easing of tensions and, in addition, an outside chance that the Government might revise its stockpiling methods and allocation systems.

At present the most significant development is that indicated by incoming data on retail trade, industrial output, inventories, personal income, and price indices. Most of these suggest that the recent recession has leveled off, and that the final quarter will prove to have been characterized by stability, with a slight upward tendency. Most price indices, for example, fell steadily between April and September. Since August, however, prices have begun to show greater firmness. The Guaranty Trust Company's index of wholesale commodity prices for November stands 2.5 per cent above the low point reached in August. The Bureau of Labor Statistics' weekly index of average primary market prices remained almost unchanged between mid-October and mid-November. Consumer prices—the cost-of-living index—began to rise again in September after a temporary lull during the summer. The advance in the consumer price index raises the possibility of future price advances in other parts of the general price structure, since workers covered by so-called escalator contract may seek

further amounts (beyond the 10 per cent increase permitted over January, 1950, levels) from employers. The further question has been raised whether the steel wage negotiations will eventuate in higher prices under the impact of higher costs. Such an advance would have a far-reaching effect, since steel prices are influential determinants of many other prices.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Production Levels

Along with recent firmness in prices, basic production figures also seem to point to stability. Steel output during the four weeks ended November 17 varied between 5.8 and 1.6 per cent above last year's production, with an average of about three per cent above the 1950 level. Passenger car output during the same period varied little at about 33 per cent less than last year. Electric power production ranged from 12.5 per cent to 9.9 per cent above last year's output. Petroleum was fairly constant at a level about 6.6 per cent higher than production last year.

While there were indications of partial recovery in the radio-television industry and in lumber output, some weakening was noted in paperboard production and in some divisions of the textile industry. The general feeling of most analysts is that, despite some continuing dislocations in a few consumers' goods industries, business as a whole is becoming adjusted now to the new levels necessitated by last summer's recession.

One important factor in that adjustment is the status of inventories, which has been improving for several months. Total business inventories at the end of September are estimated at \$69.3 billion, which after seasonal adjustments, is about \$250 million lower than the August figure.

An increase in manufacturers' inventories was again offset by a greater decrease in retailers' stocks. This tendency is believed likely to show up in October reports also. Wholesalers' stocks were unchanged. The continued increase in manufacturers' inventories is widely regarded as a temporary effect of a tooling-up process in which supplies have increased faster than deliveries.

(Turn to page 150, please)

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E-96—Transfer Machine

A 22-station, in line, transfer type special machine for processing the intake manifold of a V-type engine block

has been developed by Snyder Tool & Engineering Co., Detroit, Mich.

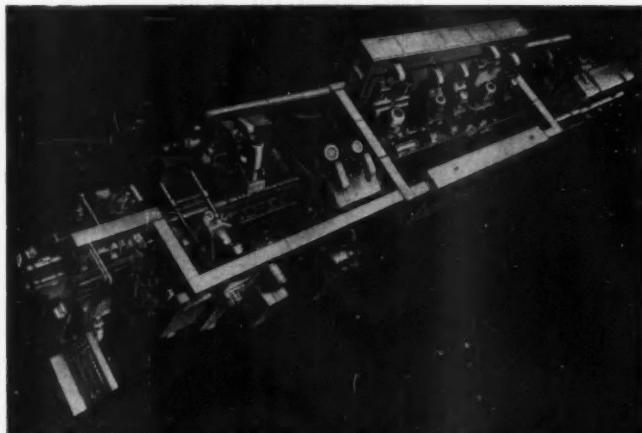
The machine drills, taps, reams and spotfaces all holes and mills the carburetor and water outlet pad. It has a

capacity of 72 pieces an hour at 80 per cent efficiency. Loading is manual and controls are automatic in normal use but may be switched over to manual if desired.

Work-piece is hydraulically located and clamped at each station and is moved between stations by a hydraulically operated transfer bar.

Tools are high speed steel and carbide mill cutters; tools are preset and are changed manually. Tool speeds are 80 sfpm in drilling operations and 250 sfpm in milling operations.

Fixtures move on V-type rails with hardened and ground surfaces to minimize wear. Machine units are standard guide bar and way-type units adapted for use on this machine.



Snyder 22 station in-line transfer machine.

E-97—Grinding Machine

The Norton Co., Worcester, Mass., 42 in. by 72 in. special universal jet part grinding machine is a heavy production grinder equipped with the universal features necessary for grinding jet engine components. A production-type wheel slide takes a 30 in. diam grinding wheel and swivels 180 deg by power. The wheel slide is clamped hydraulically.

(Turn to page 66, please)

News of the Machinery Industries

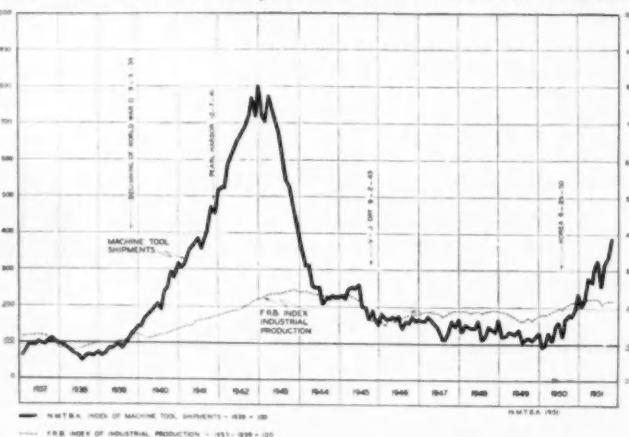
Tool Shipments Up

According to the latest data received from the National Machine Tool Builders Association, new orders are still on the increase but the ratio of unfilled orders to the demonstrated production rate is on the decrease. Preliminary figures show that the index, 1945-46-47 base, for new orders is 398.6 for October versus 380.2 for September, while the ratio of unfilled orders is 22.2 versus 23.5 for October and September respectively.

Of course this all adds up to an increase in the shipments of machine tools. In October, shipments increased by 16 per cent over the previous month. With an index based on 1939, the accompanying chart shows that the October index of 390 is almost half of the WW II peak of 790 hit in December 1942. This is figured on the dollar value of tooling shipped.

(Turn to page 84, please)

Index of Machine Tool Shipments and Total Industrial Production





Working in close harmony



Sealed Power

PISTON RINGS · PISTONS
CYLINDER SLEEVES

Publications

AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

D-182 Tubing

Revere Copper and Brass Inc.—The variety of patterns, sizes, and gages in which its lockseam tube is fabricated in all commercial metals has recently been catalogued.

D-183 Attachments

Crozier Machine Tool Co.—A four-page folder describing tool post turrets and collet closing attachments is available.

D-184 Induction Heating

Westinghouse Electric Corp.—A 12-page booklet on induction heating is available.

D-185 Chain Drives

Link Belt Co.—Offered is a catalog, No. 2065, on silent chain drives for automobile, truck, bus and industrial engines.

D-186 Paint Arrestors

Research Products Corp.—A booklet, Yale & Towne Mfg. Co.—A 12-page

1167, describing and illustrating the firm's paint arrestor equipment is available.

D-187 Abrasive Disks

Simonds Abrasive Co.—A four-page catalog bulletin, from ESA-54, describes use and application of nut inserted and bolt-inserted abrasive disks and cylinders for horizontal or vertical spindle disk and surface grinding operations.

D-188 Taps

Detroit Tap & Tool Co.—A catalog listing of standard taps has just been made available in the form of a 36-page booklet.

D-189 Burrings

The Sheffield Corp.—Catalog B380-51 illustrates and describes the gear Deburrizer for burring external gears—spur, helical, hypoid and bevel—as well as multiple start worms.

D-190 Electric Trucks

Yale & Towne Mfg. Co.—A 12-page

brochure describing the firm's complete line of electric trucks in capacities from 1000 to 100,000 lb has been prepared.

D-191 Welding

General Electric Co.—An electrode-selector chart, listing the electrodes to be used in the welding of various metals, has been announced as available.

D-192 Solenoids

G. H. Leland, Inc.—A four-page bulletin just published describes a few of the many applications of Ledex rotary solenoids.

D-193 Lift Trucks

Towmotor Corp.—An informative booklet entitled "What Makes It Tick?" or "The Inside Story of Towmotor" has just been published.

D-194 Drawing Compounds

E. F. Houghton & Co.—The physical properties and applications of drawing compounds for every type of drawing operation are included in a revised edition of "Drawing Compounds" by Houghton."

D-195 Gear Finishing

Michigan Tool Co.—A four-page folder, entitled "Gear Finishing—When, Where and How to Use It," is now available.

D-196 Fibers

E. I. du Pont de Nemours & Co., Inc.—"This is du Pont—Man-Made Fibers" recently issued reports on the development of duPont's five basic fibers.



THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

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Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.

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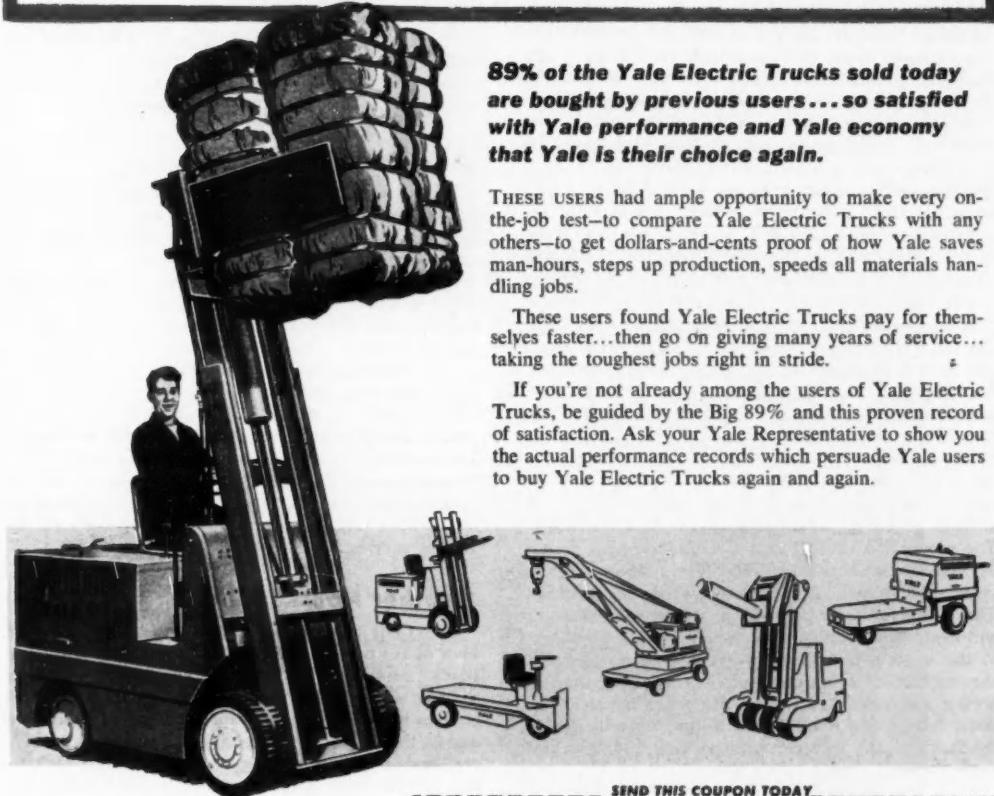
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AIRBRIEFS



By ROBERT McLAREN

Behind Schedule or On Time?

The press these days is filled with charges that the aircraft production program is "one year behind," that we are producing only 150 planes per month instead of the 1000 "scheduled," etc. The aircraft manufacturing industry, doing a phenomenal expansion job, is apparently being victimized by these charges. Like the office stenographer loaded with work at five PM, the industry is being handed the bag assembled by the Pentagon planners in their nine to five stratospheric thinking. Leading the list of these "planners" is President Truman himself, who initiated the "Alice in Wonderland" program with his demand for a 50,000-planes-per-year industry base more than a year ago (obviously emulating F.D.R. a decade ago). Truman, it will be recalled, personally withheld a half-billion dollars that had been legally appropriated for the Air Force during the ill-fated tenure of Louis Johnson.

It is only in the Truman administration that a planner is a full-time professional man. Down at the working level in industry, planning is something a hard-headed production man engages in once or twice a year to insure there being some paperwork involved in his activities. The actual fact is this: the aircraft manufacturing industry has increased its production 100 per cent of airplanes that cost 300 per cent more to build (materials, equipment and labor) in just 18 months of effort—and the program is accelerating. The production rate will hit 500 airplanes per month by mid-1952 and possibly 700-800 by the end of the year. About one-half of these will be jet aircraft. The enormous potential of the automobile industry will begin to enter the scene during 1952, particularly in the engine-building category, and this will mean the availability of an enormous potential for the following year. The administration fears a public let-down following a cease-fire in Korea; unpublicized is the fact that the industry fears an administration let-down under the same circumstances.

A Deserved Honor

Award of the 1951 Collier Trophy to the helicopter industry will be hailed on all sides as a popular and well-deserved recognition of an entirely new industry. Culmination of a decade of up-hill technical and political fighting for rotary-wing aircraft was the helicopter-delivery of a complete Marine regiment at Wonson last month in Korea.

The story of the helicopter in Korea is a bright one

and helicopter leaders make no bones about the fact that Korea advanced the cause of the helicopter by about 10 years in one. Rugged, ubiquitous and unique, the helicopter not only has rendered practical a literal "vertical envelopment" of enemy strongpoints but has clearly established its commercial potential as well. It has been truly a helicopter year in 1951 and the still-infant helicopter industry is the one segment of aviation showing certain long-time, steady growth potential—regardless of war or peace.

An Aircraft Chassis

The decades-old difference between the aircraft and automobile industries may be virtually closed by the new Douglas AD-5 Skyraider Navy carrier plane. In this redesign of the famed dive bomber, Douglas engineers have produced a "universal chassis," capable of large-scale production, into which the Navy can install any of 12 sets of equipment from kits assembled for the purpose. Thus, the new AD-5 can be converted all the way from an eight-passenger transport to an early warning radar aircraft while actually at sea aboard a carrier. Other versions, such as dive bomber, rocket assault, fighter, etc., can be as easily created by kit installations. It carries to a new degree the wartime concept of the "frozen" production model and the modification center but instead of the latter being an overflowing factory in Arizona, it is now the local air base or carrier.

Another Nonsked Blow

The Civil Aeronautics Board has struck another blow at the non-scheduled airlines by ruling that "aircoach" service is no longer a specialized operation making a profit by reason of its peculiar circumstances but is, instead, a virtually standard procedure and is, therefore, the exclusive province of the already-certificated airlines. A total of 15 nonsked airlines had applied to the Board for aircoach route certificates but 11 of these dropped out during the lengthy hearings and the final four, Air America, California Eastern, Great Lakes and Trans American airlines, were denied their applications.

The Board held that the nonsked airlines (and the scheduled routes they sought) offered economical transportation solely because they operated between rich traffic potential cities, such as New York-Los Angeles, New York-Miami, etc., and ignored stops at

(Turn to page 120, please)



OVERSPEED and CIRCUIT CONTROL GOVERNORS

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PROTECT your engine and equipment from damage caused by overspeeding.

This INSURANCE costs so little for its protection that no power plant should be without it. Since 1932, SYNCHRO-START GOVERNORS and CONTROLS have been in use all over the world protecting and controlling power plants and many other types of machinery where circuits are to be made or broken at pre-determined speeds.

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This LITTLE GIANT is doing all sorts of jobs on engines and many kinds of machines. It has a ten pound pull and a half inch stroke.

It has many uses and can be used any place where an operation is desired. It is used for operating throttles, fuel pump rocks, chokes, anti-Dieseling devices, valves, switches, and many other uses where automatic or remote control is desired.

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Automatic Engine Control Equipment

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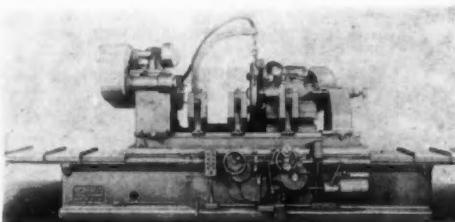
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(Continued from page 60)

ly and is operated automatically through an interlock on the swivel motor switch.

It grinds full diameter work (42 in.) with the full size (30 in. diam) wheel.

Norton jet part grinding machine.



The wheel is rapidly positioned toward or away from the work piece by a power mechanism, and it may be

stopped at any point in its travel when being positioned by power.

An index on the wheel feed handwheel makes possible settings in work diameter reduction as fine as 0.0001 in. Power wheel feed at table reversals is automatic and adjustable for amount of feed.

A sliding table moving on widely spaced ways supports a swivel table for grinding taper work. Both tables are heavily ribbed. The top of the swivel table slants toward the grinding wheel.

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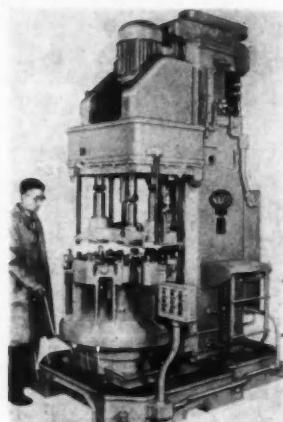
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Pacific Coast Representative: GORDON Z. GREENE CO., 2335 E. 8th St., Los Angeles 21, Calif.

E-98—Vertical Drilling Machine



National Automatic Tool Co., Richmond, Ind., has brought out a model C2A vertical Holeset drilling machine, designed for automotive manufacturing. It performs core drilling, drilling and semi-finish reaming 20 connecting rods and caps per hour. The machine has a flat slide upon which is mounted a fixed center gear driven head containing four spindles mounted in anti-friction bearings. A 24 in. diam, three position manually operated rotating table is used. It has a Natac three position fixture arranged to accommodate one connecting rod and cap in each position while performing the following operations: Position one—Remove and load one rod and one cap. Position two—Core drill one hole in rod. Drill one hole in rod. Position three—Core drill one hole in cap. Semi-finish ream one hole in rod.

(Turn to page 68, please)

CONSOLIDATED

FREIGHTWAYS INC.
PORTLAND, OREGON

PORLAND, OREGON
March 5, 1951

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Peller Manufacturing Company
Baldwin, Michigan
April 1940

very truly yours

"With such laboratory proof at hand, it is our conclusion that the use of transmission oil filters should materially extend the life of transmission gears and bearings."

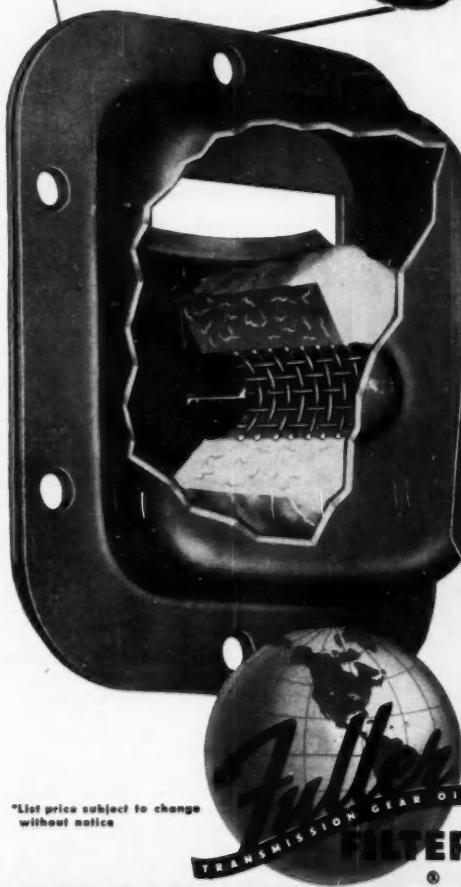
Superintendent of Maintenance



Consolidated Freightways, Portland, Oregon, road-tested Transmission Gear Oil Filters before installing them on all unit and auxiliary transmissions in their fleet. And here is what the road-test, combined with laboratory tests, proved:

On one test, transmission gear oil in a Fuller 4B86 Transmission was sampled after 23,198 miles of service when the Fuller Transmission Gear Oil Filter was installed . . . 33,603 miles later, the same oil was again sampled and "laboratory analysis proved that the oil that had accumulated the higher mileage, was much less contaminated with foreign material than when the filter was installed."

That's why Mr. Ogden is enthusiastic about filters for transmission gear oil. He has proof that there is a way to prolong the life of bushings and bearings.



***List price subject to change without notice**

In the Fuller Transmission Gear Oil Filter, normal pressure of rotating gears forces the oil through a cleansing filter and returns it to the gear box. Filter element is replaceable. Unit quickly installed on Fuller Transmissions and most other makes over power take-off opening. And, you pay only \$6.95 List* for a Fuller Transmission Gear Oil Filter to protect you against unnecessary down-time and resultant expense.

for only **0.95***

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

AUTOMOTIVE INDUSTRIES, December 15, 1951

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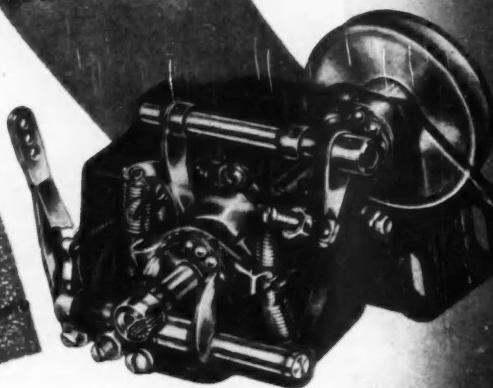
.....longer life

....less maintenance

Exclusive Hoof design gives extremely close regulation over a wide operating range without spring change.

Ball and roller bearings at all load points keep friction at a minimum and make for both long life and continued accuracy in operation.

Oil seals are used throughout and housing has large oil capacity. Daily or frequent oilings are not required.



HOOF PRODUCTS CO.

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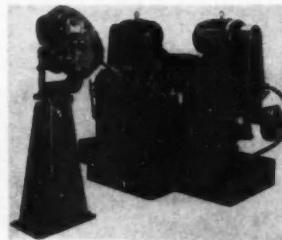
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(Continued from page 66)

E-99—Grinder

The Gardner Machine Co., Beloit, Wis., has developed a machine for grinding both flat surfaces of carburetor valve seats in one operation. It is known as the Gardner No. 115-18 double spindle grinder.

Head slides move on ball bearing ways upon the cast iron base; heads may be



Gardner double spindle grinder, No. 115-18.

pivoted. Abrasive disks 18 in. in diameter are carried on heavy precision spindles.

A rotary work carrier brings small parts between the abrasives. The hopper feeder, feeds the parts down a chute where a pneumatic transfer device snaps them into the rotating carrier. Valve seats are automatically ejected after grinding.

Production averages 40 to 50 pieces per minute, removing 0.006 in. overall stock. Tolerances of 0.0005 in. for flatness, 0.001 in. for parallelism and 0.001 in. for uniformity are maintained, according to the company.

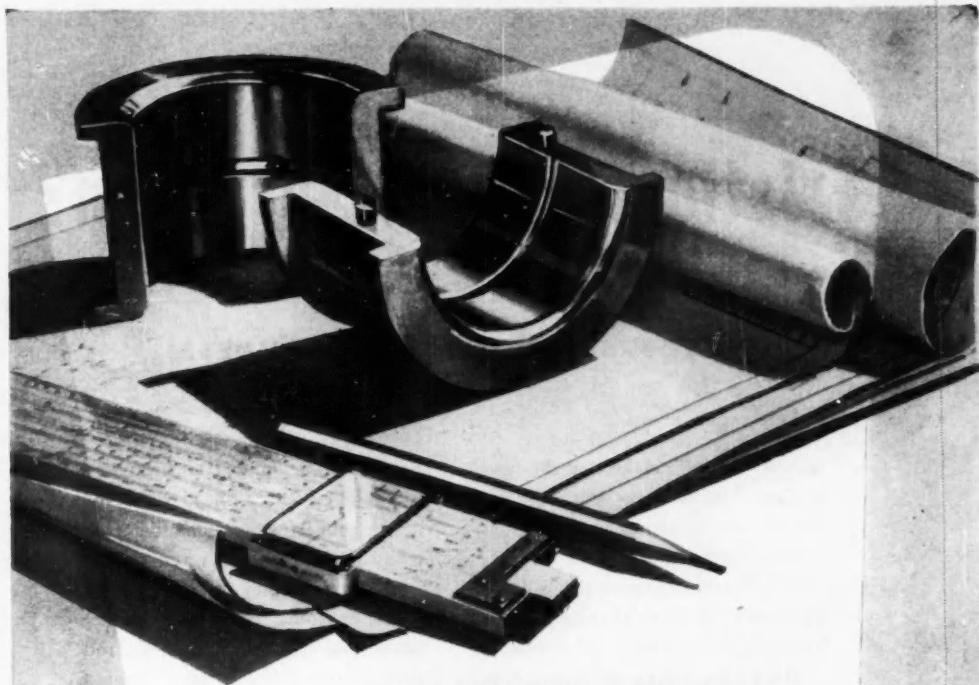
E-100—Geared Head Lathes

In recent months, British Industries Corp. has introduced into the American market the Dominion lathes as manufactured by Colchester Lathe Co., Colchester, England. These lathes are made in three sizes.

The front of the spindle is carried on the new SKF machine tool double row cylindrical roller bearing with a combined thrust and radial bearing at the rear end. Cutting thrust is taken by a precision ball thrust race.

Apron is of double wall type, all shafts having two bearings. Feed and screw cutting controls are interlocked.

(Turn to page 72, please)



JOHNSON BRONZE *Welcome* BEARING PROBLEMS

Before designing sleeve bearings for any application, Johnson Bronze engineers make full use of considerable information. They study load, shock, speed, temperature, corrosive conditions and other service considerations. As satisfactory performance of the motive unit is dependent on bearings that meet these operating conditions, complete data is imperative. Based on these studies, Johnson Bronze may recommend any one of several types of sleeve bearings and will design it to meet all requirements. This is the type of bearing service you can use at a profit. Write, wire or call today for an appointment.

for the ENGINEER

Bearing data sheets which cover the fundamentals of Sleeve Type Bearings are available at no cost. They are written by Johnson Engineers. Write for complete set today.

Johnson Bronze

SLEEVE BEARING HEADQUARTERS

625 SOUTH MILL STREET • NEW CASTLE, PA.

Friction material problem?

R/M BELONGS IN YOUR PICTURE!

"STOP-AND-GO" IS OUR BUSINESS!

Maybe you don't make over-the-road haulers... but whatever your problems in brakes and clutches, you can count on RAYBESTOS-MANHATTAN for specialized friction materials that will give you the same good results heavy-truck-builders get from their R/M products.

More cars, trucks and buses now use R/M brake linings, clutch facings, and automatic transmission friction parts than any other make. And R/M's leadership in these products extends to scores of other fields, from farm

equipment to musical instruments.

You'll be a step ahead when you call in your R/M representative. He's ready to help you . . . and he can work from samples, from designs on paper, or from figures on horsepower developed, combined with desired performance characteristics. Behind him stand the facilities of the world's largest producers of friction materials, with six great plants . . . their research departments, and their testing laboratories.



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RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION

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Canadian Raybestos Co. Ltd., Peterborough, Ont.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings
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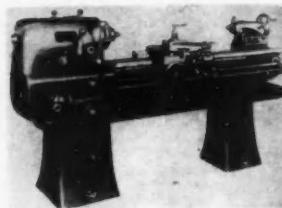
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(Continued from page 68)

The straight bed is of the inverted vee type. The saddle is of the American wing type with long bearing surfaces carrying compound slides. All bearing sur-

faces are precision ground. Standard toolpost is of the American boat pattern. The loosehead is of the most modern design with large diameter spindle and screw.

All models have self-contained motor



Colchester Dominion lathe.

drive and the motor is controlled by a lever on the front of the headstock, operating through an air-break starter built into the machine.

The all geared headstock forms a totally enclosed oil bath which is self lubricating. All threads are to A.N.C. standards.

E-101—Profiler

Morey Machinery Company, Inc., New York, N. Y., has announced that its highspeed vertical profiler and milling machine, No. 12M, has been thoroughly redesigned to include many refinements not available on the older models.

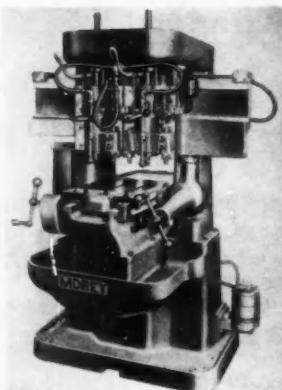
The Morey profilers are equipped with improved spindle bearings. There are splined shafts in place of keyways,



The combination that
has won initial equip-
ment and replacement
leadership for—

TUNG-SOL AUTO LAMPS

TUNG-SOL ELECTRIC INC., Newark 4, New Jersey • Sales Offices: Atlanta
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Morey vertical profiler and milling ma-
chine, No. 12M.

including the spindle. Other new features are hardened and ground steel ways on the cross-slide, while the travel-head is now mounted on rollers which ride on ball bearings.

Standard equipment now includes slotted table, table and cross-slide stops, a drawbar and collet. The 12M Morey profiler, designed for duplication of small parts requiring interchangeability, is available in the double spindle type. It reproduces aircraft and gun parts, etc., from a flat master.

(Turn to page 74, please)

Specializing In
HANDMADE SAMPLES

SHORT RUN PRODUCTION

MAGNESIUM
STEEL
ALUMINUM
COPPER
BRASS

Skeleton wood form, 100" x 20", for handmade jettison tank.

**METAL FORMED FROM
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No other company in the United States offers this diversified approach to your tooling problems, for we are restricted neither in the type of die materials to be used nor the type of presses upon which the part will be formed. The quantity always determines the expenditure.

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*Ask
for
DETAILS*

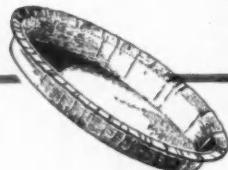
HART PRESSED STEEL CORPORATION, ELKHART, INDIANA



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for paint spray protection.

PLUGS to seal off the speedometer hole . . .
to plug up an oblong hole on the manifold assembly.
to slip over the carburetor opening . . .
a masking protector on fuel pumps . . .
to protect against dust, dirt and lint . . . in storage or in transit to installation.



CLEVELAND CONTAINER PLUGS SLEEVES CAPS ARE OF EVER INCREASING IMPORTANCE TO THE MANUFACTURER.

We design and produce them to meet the most exacting needs.

Our Plugs and Sleeves obtainable in diameters from $\frac{1}{8}$ inch up. Caps from $\frac{1}{4}$ inch up.

Special Sizes and Shapes to meet YOUR needs.

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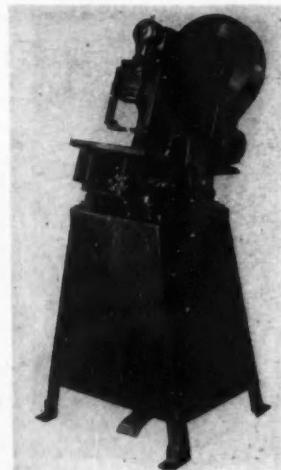
NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 62

(Continued from page 72)

E-102—Punch Press

A small, powerful inclinable punch press has been added to the Whitney Metal Tool Co., Rockford, Ill., line. The



Whitney punch press, model 127.

press, designated No. 127, is an open back machine which can be tilted to a maximum of 25 deg.

It is rated at 275 strokes per minute, and has a capacity of five tons. It is equipped with a positive non-repeat clutch which, if desired, can be released for automatic feed. Throat depth is six in.; height of throat is seven in.; length of stroke is one in. with a stroke adjustment of $1\frac{1}{4}$ in. The machine is designed to use all standard Whitney-Jensen dies; die space being $5\frac{1}{4}$ in., with stroke down and adjustment up.

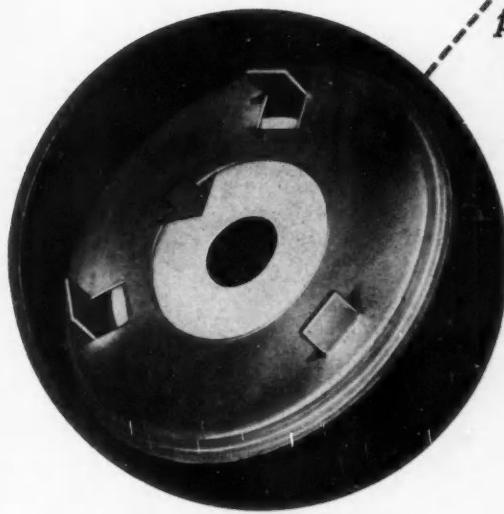
Of welded steel construction with a steel housing skirt included, the floor model stands 59 in. high; width at base of 22 in. and depth 28 in.

E-103—Cold Rolling Mill

The Loewy Rolling Mill Div., Hydro-press, Inc., New York, N. Y., recently put in operation two high-speed installations for the rolling of aluminum

(Turn to page 76, please)

Strength of Du Pont nylon plastic in thin sections



Drawing and part shown here illustrate clutch-pedal seal. Similar assembly is used for the brake seal. Washer of nylon plastic—indicated by arrow—moves freely to compensate for irregular path of pedal shaft, irregular pressure of driver's foot. (Washer molded by Sinker Mfg. & Tool Co., Chicago)

*permits valuable
space-saving in Hudson clutch-
and brake-pedal assembly*

When Hudson set out to design a car with a shorter wheelbase, their engineers were faced with the problem of conserving as much space as possible within the engine compartment. By installing pedal toe-plate bumper seals containing washers of Du Pont nylon plastic, they reduced the space required for the floorboard clutch and brake seals by one-half.

These compact seals are made possible by molded nylon's outstanding strength in thin sections, abrasion-resistance, and noise-damping characteristics. As the washers move backward and forward within the metal retainers (compensating for irregular paths of pedal shafts), they form an effective seal against noise, fumes and dirt from the engine compartment. Nylon has the toughness to withstand the blow given by the return of spring-loaded pedal cranks, and the abrasion-resistance to stand up under constant rubbing against metal retainers as the shafts move up and down. And not only does the washer move quietly, but nylon tends to damp resonant torsional vibration. Further, nylon is heat-resistant, and unaffected by gasoline and oil.

Perhaps nylon's abrasion resistance, strength in thin sections and other valuable properties can help solve a problem for you. For further information on nylon and other Du Pont plastics, write:

E. I. du Pont de Nemours & Co. (Inc.)

Polychemicals Department, District Offices:

General Motors Building, Detroit 2, Michigan

350 Fifth Avenue, New York 1, New York

7 South Dearborn Street, Chicago 3, Illinois

845 East 60th Street, Los Angeles 1, California



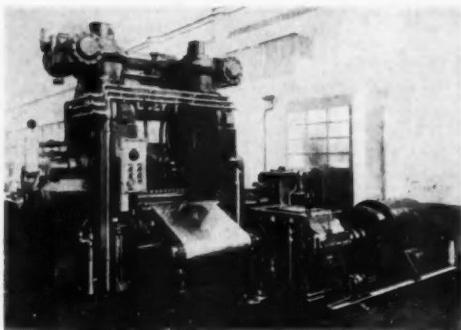
NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please use coupon on page 62

(Continued from page 74)

foil, 42 in. wide by 0.00025 in. thick. Each of these installations is composed of one four-high roughing mill, 10 in. and 24 in. by 48 in., and one two-high

Loewy high-speed cold-rolling, four-high roughing mill.



Exclusive features protected by U.S. patent Nos. 1958725, 2140818 and 2230471.



The unrivaled service life of Aetna T-Type Clutch Release Bearings has always made them the most economical in the long run. Once installed they are trouble-free, attention-free for vehicle life. Thanks to their patented design and self-lubricating features there's no need of costly machining operations for oil lines or grease fittings—no need of further maintenance whatsoever. Think what that saves in man and machine hours on the assembly line, in saving upkeep costs for the vehicle owner.

It's a trusty sign of dependability and economical performance in any vehicle—the famous Aetna T-type bearing. Investigate. Find out the many other sound reasons why Aetnas deserve a place in your specifications.

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In Detroit: SAM T. KELLER, 2457 Woodward Avenue

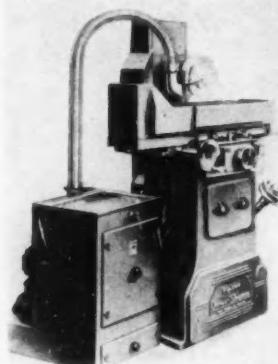
T-TYPE Clutch Release BEARINGS
WITH THE . . . THAT TAMES TROUBLE

finishing mill, 18 in. by 48 in. with their accessories. These mills are said to be capable of producing foil at speeds up to 3000 fpm.

E-104—Hydraulic Surface Grinder

British Industries Corp., New York, N. Y., the exclusive representative in the United States for Jones & Shipman, Leicester, England, is now offering for early delivery the type 540 hydraulic surface grinder.

The vertical adjustment of the wheelhead is 0.0001 in. divisions and the fine adjustment for the vertical wheelfeed



Jones & Shipman hydraulic surface grinder, model 540.

is 0.0001 in. Wheelhead spindle runs in plain journal and thrust bearings, and is hardened, ground and tapered at the front end to receive grinding wheel flange plates. The bearings are diamond bored and the spindles are ground and super-finished to within two micro-inches, rms. Drive to the spindle is from a one hp constant speed motor, fitted on vibration proof rubber mounting and mounted inside the column on the wheelhead slide.

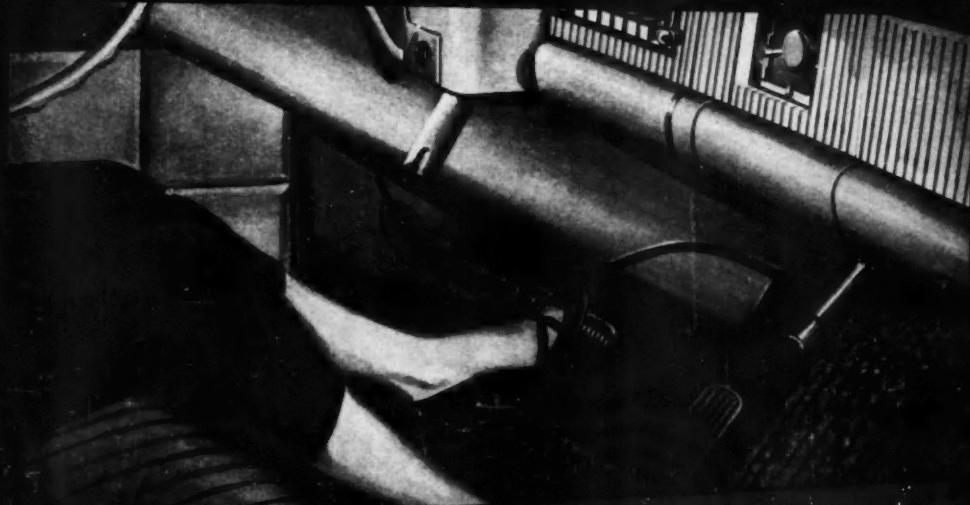
Table traverse is arranged for hydraulic and hand operation, and either can be used.

(Turn to page 80, please)

KELSEY-HAYES

POWER BRAKING

ASSURES CONTROL



Today's most advanced development in power braking is Kelsey-Hayes amazing "VACDRAULIC", forerunner of even more startling Kelsey-Hayes developments for tomorrow's motor cars.

Kelsey-Hayes "VACDRAULIC" is the only unit to power the brake action instantaneously, with perfect "feather-touch" control, assuring perfect "pedal feel" in direct proportion to the pressure applied. Kelsey-Hayes "VACDRAULIC" cuts foot pressure by as much as two-thirds that required for ordinary brakes!

"VACDRAULIC", the only unit utilizing complete hydraulic control with a fixed reaction ratio, insures perfect "feather-touch" control at all pressures.

NOW! . . . Kelsey-Hayes "VACDRAULIC" power brakes are standard equipment on over 100,000 cars of one of the world's leading automotive manufacturers. (Kelsey-Hayes engineers will gladly consult with you on the superior advantages of VACDRAULIC POWER BRAKES as original equipment on your new cars.)



ASSURES PROVEN PRODUCTS AT

DETROIT 32, MICHIGAN



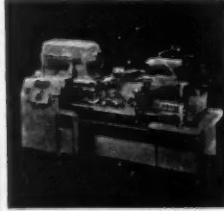
PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.
PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

Keep in Step with Monarch and Keep Ahead of Obsolescence



13" MODEL 70
TOOLMAKER'S LATHE

The lathe that has everything. The ultimate for master toolmakers. Unparalleled for accuracy, speed and convenience of operation. Features include—speed range of 12 to 2000 R.P.M., develops up to 20 H.P., depending on speed, four directional rapid traverse, and built-in constant surface cutting speed. Tailstock hydraulically operated and easily repositioned.



SERIES 40 ENGINE AND
TOOLMAKER'S LATHES

In 12", 14", 16" and 20" swings. Offering such typical Monarch features as totally enclosed end gearing and gear-box—automatic pressure lubrication—all anti-friction bearings—hardened helical gears in headstock—American Standard Camlock Spindle Nose—flame-hardened and ground integral bedways—hardened alloy steel working parts.

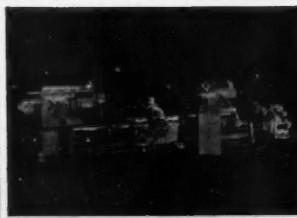
THE AIR-GAGE
TRACER

Turn, bore or face using a flat or a round template. With or without fully automatic cycle and infinitely variable feed. Applicable to complete range of sizes from 10" to 32" swing.



ROLL TURNING LATHES

For the contour turning of steel mill rolls from a template. Reduces turning time up to one much as 75 to 85%. Garser contours which can always be duplicated exactly. Eliminates the need for hundreds of expensive form tools. Much easier to operate than conventional roll turning lathes.



WHEN YOU LOOK more closely at the Monarch lathes below, there are two important points to keep in mind. First, you'll find in them every desirable production and design feature required to meet the highest standards—features playing a basic performance part in a line of lathes noted for improved accuracy, faster production and longer life. Secondly, it will pay you to remember that, while many of these features are now standard in the industry, *every one of them was developed and first introduced on Monarch turning equipment.*

MONARCH USERS, in other words, have through the years been first to benefit from each of these developments. And they've benefitted doubly. Through cost reduction and product improvement on one hand. On the



THE MONARCH New Development Building—where tomorrow's lathe developments are planned today!

other, through the purchase of lathes destined for a longer, unrivaled production life.

AS A MONARCH BUYER TODAY, you face the same

enviable prospect. Our company, founded in 1909 and built on the principle of continuous research and development, devotes a major portion of its energies today to that principle. Our New Development Building, with its equipment and staff, is the physical symbol of our determination that the lathe improvements of tomorrow will appear first on Monarch products. It implements our promise that you can always rely on Monarch for the turning equipment to assure you peak production at minimum cost to keep you ahead of the parade *The Monarch Machine Tool Company, Sidney, Ohio.*

TOOLMAKER'S LATHES • ENGINE LATHES • TRACER-CONTROLLED PRODUCTION LATHES
ROLL TURNING LATHES • AIR-GAGE TRACER, MOTOR-TRACE & KELLER CONTROLS

Monarch

TURNING MACHINES

FOR A GOOD TURN FASTER... TURN TO MONARCH

THE SHAPEMASTER ENGRAVER

Here is a lathe that reduces the expensive and time-consuming art of hand engraving to the speed and repetitive accuracy of machine tool operation. Will reproduce any design detail which can be touched by the sharp point tool employed. A cost reducer of great importance for the producing of intricate molds in the glass, plastics and mechanical rubber industries.



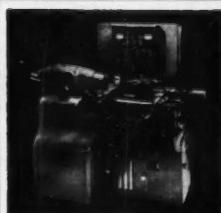
THE MONA-MATIC

A new and outstanding successful approach to production metal turning. Use of a single running tool speeds production, slashes tool costs, tool change time, and setup time, increases accuracy and often halves time required for subsequent grinding operations. Available with magazine load.



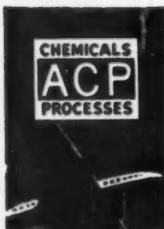
MOTOR-TRACE CONTROLS

The ideal tracer control for most step shaft work. This, with the "Air-Gage Tracer" and Keller Controls, provides Monarch users with a choice of either one of three distinct types of tracer control.



THE SPEEDI-MATIC

A fast, precision, electronically controlled hand screw machine. Short setup time makes it practical for quantities of 25 or less—up to 3000 or more. As many as nine different speeds and six different feeds may be preselected to become operative at proper time in cycle. Suitable for first or second operation work. Speed range—40 to 4000 R.P.M.



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- MIL-C-5541 U.S. Navord O.S. 675
MIL-S-5002 16E4 (Ships)
AN-F-20 U.S.A. 72-53 (See AN-F-20)
AN-C-170 (See MIL-C-5541)

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ALODIZING is an electroless protective surface conversion process for bonding paint to aluminum and protecting the metal.

Tough, durable ALODIZED surfaces are obtained easily and rapidly by immersion, brushing, or spraying in a multi-stage power washer.

ALODINE amorphous phosphate coatings provide extra paint permanence and extra durability for aluminum parts and products.



BRUSH "ALODINE" PROTECTS ALUMINUM IN THE FIELD, SHOP, OR HANGAR

Brush ALODINE is easily applied in a simple brush-on or flow coat process to large assemblies and surfaces—airplanes, trucks, trailers, boats, housing, building siding, railway cars, bridges, etc.—that are too bulky or too remote to be conveniently treated in tanks or a multi-stage power spray washer. The cleaning and coating chemicals for Brush ALODIZING are shipped in bulk or in the convenient Brush ALODINE Chemical Kit No. 1. This Kit contains enough chemicals to treat about 1,000 square feet of surface and is an ideal package for use at airfields of commercial airlines or of the Armed Services anywhere.

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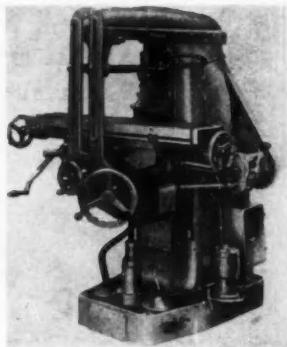
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use coupon on page 62

(Continued from page 76)

E-105—Milling Machine

Austin Industrial Corp., New York, N. Y., has announced that it has been appointed exclusive U. S. and Canadian distributor for Sajo horizontal milling machines which are manufactured in Sweden.

Sajo horizontal milling machines are medium duty, high speed type, available in both plain and universal models. Table size for both plain and universal millers is 41½ in. by 9¾ in. Longitudinal power traverse is 24½ in. for the plain miller and 27½ in. for the uni-



Sajo plain milling machine of the type being distributed by Austin in the United States and Canada. The unit is built in Sweden.

versal miller. Transverse and vertical travel either by hand or power feed are respectively 8½ in. (4½ in. with over-arm braces in place) and 19 in.

Power is transmitted to the spindle from a three hp motor mounted in the base of the column. A total of 12 spindle speeds from 36 to 1540 rpm are available through pulleys and gear transmission.

The hardened and ground chrome-nickel steel spindle has American standard No. 40 milling machine taper. Spindle is mounted in SKF precision roller bearings and is equipped with SKF thrust ballbearings. Machines are available with longitudinal power feed only or with power feed in longitudinal transverse or vertical directions. Twelve feed rates are available. All screws and dials are calibrated in inches.

(Turn to page 88, please)



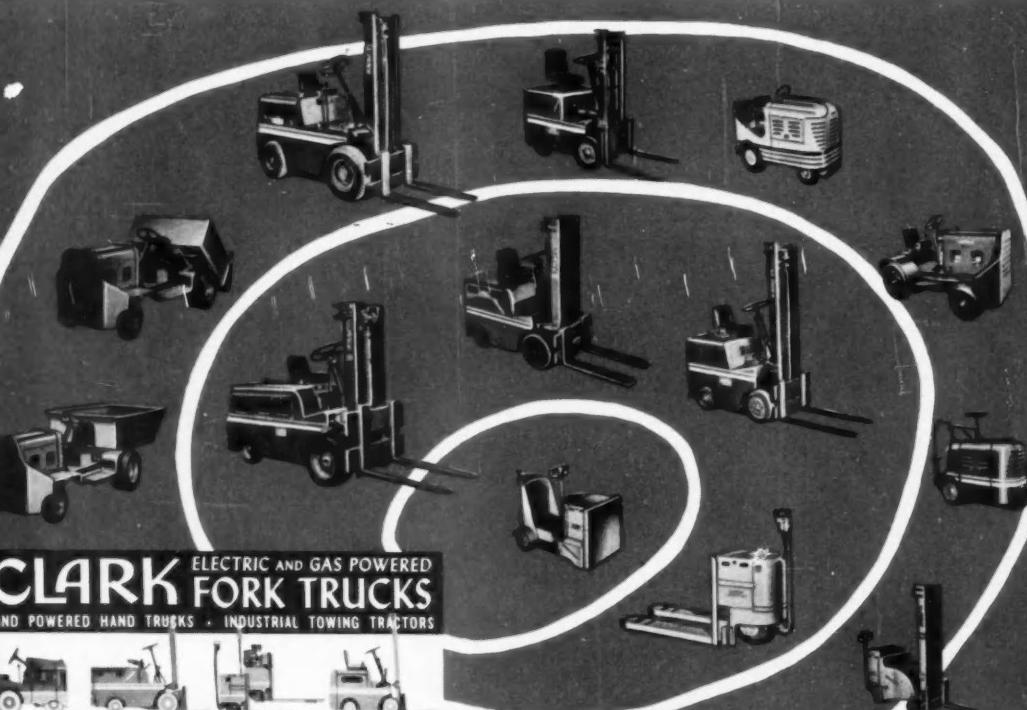
CLARK EQUIPMENT COMPANY, Buchanan, Michigan

Other Plants: BATTLE CREEK AND JACKSON, MICHIGAN

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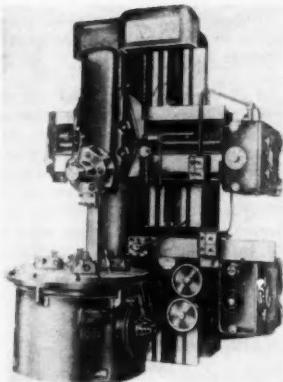
NEW PRODUCTION AND PLANT EQUIPMENT

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(Continued from page 80)

E-106—Boring and Turning Mills

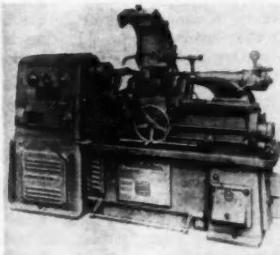
The Cosa Corp., New York, N. Y., is introducing in the United States the Froriep single column vertical boring and turning mill. Froriep vertical mills are made in four sizes having 39 in., 49 in., 55 in. and 63 in. diam tables and will take workpieces weighing up to five tons. Machines can be furnished with thread cutting equipment, taper turning equipment, tripping device, tracing device with electric tracer control and coolant system.



Cosa distributed Froriep vertical mill.

E-107—Copying Lathe

A high speed hydraulic copying or profiling lathe—the H. E. B.—has just been introduced into this country and



H.E.B. copying lathe.

Canada by H. E. B. Machine Tools, Inc., New York, N. Y. The lathes are designed and built in France by H. Ernault-Batignolles Machine Tool Div., Batignolles-Châtillon Locomotive Co.

H. E. B. copying lathe, model OP, is said to achieve elimination of vibration even at its top spindle speed of 3600 rpm, giving maximum output from carbide and diamond tools, for which it was designed. The bed is heavily cross-braced together with a one-piece base.

A copying device is an integral part of the machine. The machine copies to within plus or minus 0.0004 in. diam. Rear tool maintains plus or minus 0.0002 in. diam.

E-108—Turret Lathe

The G. M. Diehl Machine Works, Inc., Wabaash, Ind., has announced that it is now producing its No. 2 turret lathe in quantity. Designed for high speed, precision production, the lathes are standard size and use the same tooling, including collets, as other standard No. 2 sizes.

Diehl turret lathes are available in two types, hand feed and power feed. Types with power feed to the turret are available with screw feed cross slide or lever feed cross slide. The hand feed type is available with lever feed cross slide.

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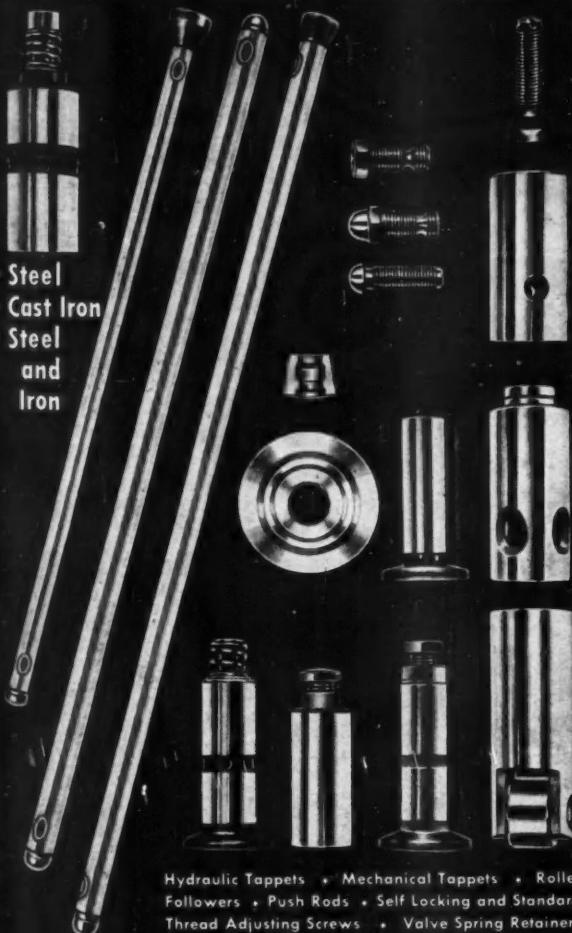
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Special Screw Machine Parts $\frac{1}{16}$ " to 5" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products.

The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

Machinery News

(Continued from page 60)

Washington Facts

A Washington spokesman for the machine tool industry states that a further 16 per cent increase seems likely for November, but the productivity rate is still not satisfactory. It is anticipated, however, that shipments will hit a rate of \$1.5 billion by July 1952 and then level off, according to this same source. This information was divulged in a recent meeting of editors with key men in the NPA and DPA. One member of the NPA panel stated that there are about 85,000 orders on the books of the tool builders and only 54,000 of these have DO ratings.

Another item which was dealt with at the conference was the manpower situation in the industry. Based on Government estimates there are now about 65,000 people employed by machine tool companies, but the industry needs approximately 18,000 to 25,000 more employees. Present work schedules, on an average, with the present manpower are about 50 to 55 hr per week.

One of the major problems concerning the builders is the acute shortage of skilled labor. A complaint most frequently offered is that defense plants lure away workers with higher salaries. This matter was brought up at the meeting and it was claimed that the Government is working on an arrangement to stabilize wages in particular occupations within certain labor markets.

Development Funds

Another item which has been brought up by several tool makers is the need for some type of legislation to permit the builders to retain a portion of present profits for future research and development programs. The industry doesn't want to go through a situation similar to the post WW II period when the present defense program folds up. This matter was discussed with a machine tool executive now located in Washington, and he claimed that the Government was looking into the matter and that possibly it might be tied into renegotiation.

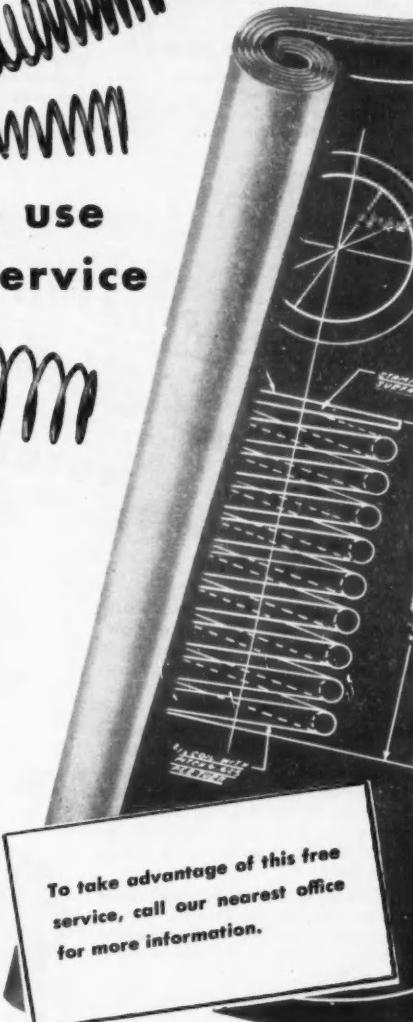
Plant Change

Control of the J. H. Williams & Co., Buffalo, N. Y., drop forging and tool specialists, has passed to the United Drill & Tool Corp., Chicago. United is an importing manufacturer of metal working tools and drills. No personnel or policy changes are contemplated.



If you use springs . . .

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Here's a chance to help the war effort, cut your costs and improve your product all at the same time.

It's simply this: submit your present or proposed spring design to our skilled spring engineers for analysis. Without the slightest obligation they will check it to see if, 1) performance can be improved, 2) amount of steel can be cut, 3) design can be simplified or, 4) costs can be lowered.

Based on previous experience, we think there's a good chance that our men can offer constructive suggestions that will do one of these four things.

Our engineers are more than designers. They're production men, too. They know all the things that spring machines can and cannot do effectively. They have their fingers on the pulse of the steel wire situation, so they'll try to select the lowest price grade of wire that will do a good job—yet be in reasonably good supply.

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AMERICAN *Quality* SPRINGS

UNITED STATES STEEL

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62.

F-125—Immersion Heaters

The redesign of two Calrod immersion heaters, for nickel and copper plating baths and for mild sulphuric acid and chrome plating baths, has been

announced by the Industrial Heating Department of the General Electric Co., Schenectady, N. Y.

Greater flexibility and portability have been incorporated in the improved units, according to G-E engineers, by



Over the years, reports from many users of products and devices powered with Lamb Electric Motors have emphasized the trouble-free operation of the motor.

Reliability, a prime requisite for successful product operation, is assured in Lamb Electric Motors because (1) the motor is designed for the specific application, (2) it is built of quality materials to the highest manufacturing standards, (3) it embodies 36 years' experience in the small motor field.

Thorough dependability is one of the reasons why Lamb Electric Motors are used by leading manufacturers. The Lamb Electric Company • Kent, Ohio.

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AMERICA'S Finest PRODUCTS



Series motor suitable for many intermittent duty applications where space and weight are important considerations.

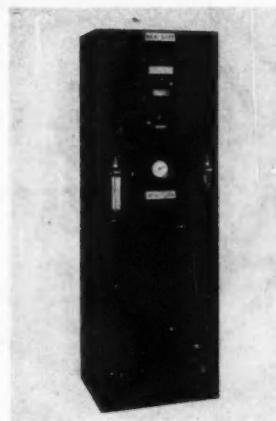


Having inbuilt control switch and receptacle, this motor is readily adaptable to portable tools and equipment.



replacing the old-style sealing cup with a new junction-box of terminal housing which is vapor-tight. In addition, the housing is said to reduce the possibility of faulty connections, and the terminals are readily accessible by removing the housing cover so the terminal connectors to the leads are exposed.

F-126—Atmosphere Generator



The Hevi Duty Electric Co., Milwaukee, Wis., has placed on the market type M-5724-S Atmo-Gen atmospheric generators which are used to provide atmospheres for the following heat treating operations clean non-decarburized hardening, dry cyaniding or carbonitriding, carburizing (carrier gas), copper and silver brazing, nitriding, sintering and bright annealing. The unit delivers 150 cu ft at atmosphere per hr.

Atmo-Gen atmosphere generator consists of an ammonia cracker which is housed in a fabricated steel cabinet. The complete unit includes an electric tube type furnace with automatic temperature control, catalyst filled alloy retort, necessary piping and flow regulation accessories.

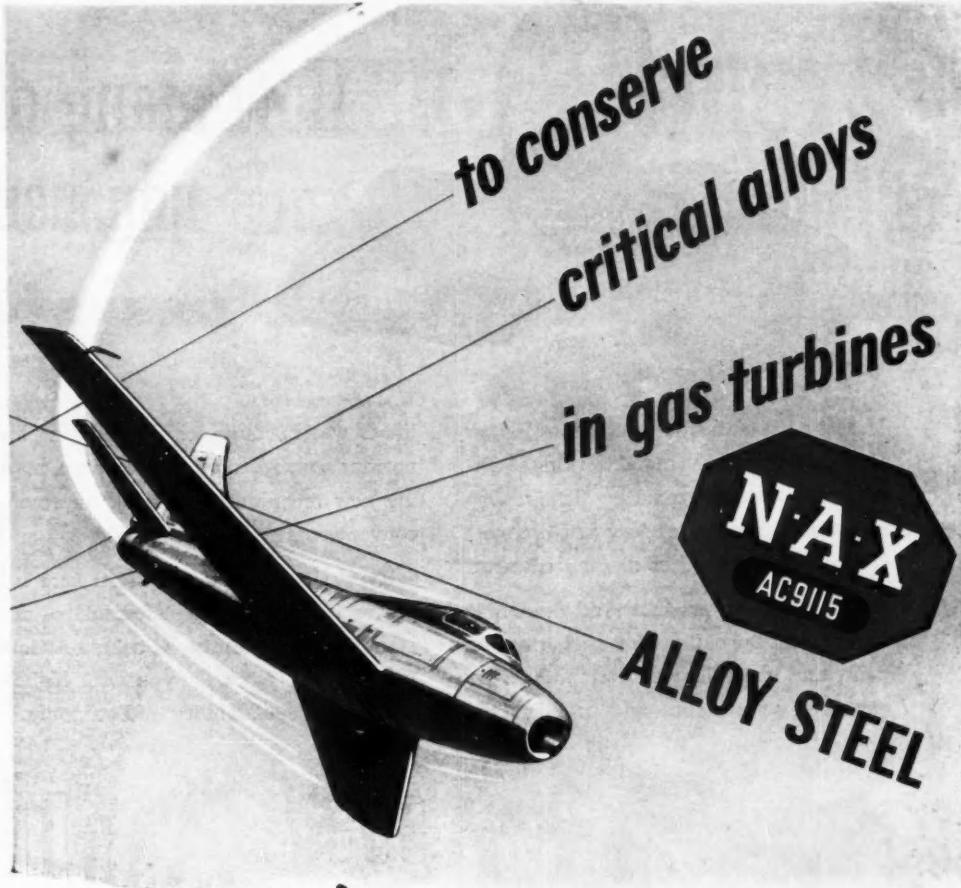
F-127—Electronic Surge Comparison Tester

An industrial electronic surge comparison tester is available from Westinghouse Electric Corp., Pittsburgh, Pa. It is used to locate insulation faults and winding dissymmetries in motors a-c and d-c generators, transformers, and oils.

The surge comparison tester, available in either mobile or portable models, is compact and movable, and has adequate surge voltage characteristics for most insulation tests.

The tester simultaneously tests turn-to-turn, phase-to-phase, and coil-to-ground insulation with potentials high enough to simulate power circuit transient stresses. With every test setup,

(Turn to page 90, please)



N-A-X AC9115 ALLOY STEEL offers a means of reducing the use of critical alloy steels of the "stainless" type in gas turbine and similar applications. In specific cases it has replaced over half the amount of strategic material originally required, with no sacrifice of quality.

N-A-X AC9115 ALLOY STEEL has high strength and toughness values at temperatures ranging from -70° F. to $+1,000^{\circ}$ F. It can be readily cold formed into the most difficult shapes; its response to welding by any process is excellent. It must, however, be suitably coated for protection against cold or hot corrosion.

Investigate the outstanding properties and characteristics of N-A-X AC9115 ALLOY STEEL and, through its use, conserve the critical material so necessary to our nation.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division • Ecorse, Detroit 29, Michigan

NATIONAL STEEL CORPORATION

How many of you use



Here is a list of the most important Parker Products used in the metal working industry today. It's an expanding list, growing as Parker research develops new products to broaden the field of metal treatment.

Some of these products add durability and protect appearance by anchoring the paint and controlling corrosion. Another enhances performance and prolongs the

life of wearing surfaces. Others bring important benefits to production lines, making new techniques practical, improving conventional operations.

Every Parker Product listed here has proved itself. Each one is formulated and manufactured to the high Parker standard of quality to work for you with highest efficiency, dependability and economy.



BONDERITE

The standard surface preparation method for metals to produce paint finishes of highest quality. Bonderite converts the surface to a nonmetallic phosphate coating, integral with the metal, which is an excellent anchor for paint and an effective corrosion resistant. An adaptable product, simply applied in spray or immersion equipment, easily controlled for dependable results. Used widely, on the world's most famous and admired manufactured products.



BONDERITE AND BONDERLUBES

Cold forming of metals is faster, easier, and more economical of time and metal because of this proven combination. Bonderite and Bonderlube combine to form a lubrication system that makes metals flow smoothly, lengthens die life, cuts metal loss. Years of experience are behind this Parker development—90% of all seamless steel tubing (and millions of feet of welded steel tube) is drawn with Bonderite. Many Ordnance items are now being manufactured with this aid.



*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

these PARKER PRODUCTS do to make your metal products better?



PARCO LUBRITE

On gears, cylinder walls, pistons, rings, shafts, valves and rods, Parco Lubrite is used to create a nonmetallic phosphate coating on the metal. This coating holds lubrication under pressure, prevents metal-to-metal contact and resulting scuffing and scoring during initial operation. The smooth, easy break-in with Parco Lubrite makes for longer subsequent service life.



PARCO COMPOUND

For 35 years, this Parker product has meant quality rust resistance for iron and steel. The dense crystalline phosphate coating becomes integral with the metal and forms an excellent base for rust preventive oil or paint finishes. Any iron or steel article, small or large, simple or complex, may be treated with Parco Compound.



PARCOLACS

A useful group of specialized products made up of various finishes for use after Parco Compound. Includes wax base finishes, stains, and rust preventive oils suitable for dip, spray or centrifuge application. Available for quick or slow drying requirements. Parcolacs add desirable appearance and performance qualities to articles treated.



PARCO CLEANERS

An outstanding line of metal cleaners formulated to condition the metal for the next step in finishing, as well as to remove grease and soil efficiently. Alkali, acid, and emulsion types, each formulated to meet certain conditions of soil, production requirements, and finishing operations which follow.

PARKER PRODUCTS MEET GOVERNMENT SPECIFICATIONS

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SEND COUPON TODAY for a showing of "What Makes It Tick" in your office. 15 minutes of helpful information with no obligation to you!

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THE ONE-MAN-GANG

**FORK LIFT TRUCKS
and TRACTORS**

RECEIVING • PROCESSING
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HOW MANY PEOPLE HAVE YOU TALKED ABOUT AMERICANISM TODAY?

Inventory control, re-planning, forecasting, and analysis all the functions necessary to make better use of materials.

Production Costs Cut 60% By Towmotor Mass Handling

**INCREASED PRODUCTION
IS RESULT OF TOWMOTOR
MASS HANDLING EFFICIENCY**

TRENTON, N.J. (TNS) — Production which has been increased at all levels will help companies to operate more smoothly and save in overhead.

DETROIT, MICH. (TNS) — Eliminating unnecessary handling has resulted in increased production which will help companies to run more smoothly and save in overhead.

CHICAGO, ILL. (TNS) — Top production in the materials handling industry is being achieved by the use of Towmotor mass handling equipment.

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NEW PRODUCTS

For additional information please use coupon on page 62

(Continued from page 86)

high-frequency and high-potential qualitative test of resistance, impedance, and turn balance are made, and the results obtained by a single scope observation. High turn-to-turn voltages are applied without excessive winding-to-ground stresses. Non-destructive testing is assured even on fractional horsepower motors and generators and destructive fault location is possible in many cases.

F-128—Dual Thread Comparator



Hanson-Whitney dual thread comparator.

As a companion instrument to its standard thread comparator, Hanson-Whitney Co., Hartford, Conn., introduced the dual thread comparator, intended to provide a more thorough visual inspection of externally threaded parts up to 1½ in. diam.

The design makes use of the same component parts as the standard comparator. But in addition to the single jaw which checks assemble-ability by means of one composite reading of pitch diameter, lead and angle, there is a second jaw with a two-thread engagement which provides a specific check of pitch diameter . . . as well as

(Turn to page 98, please)



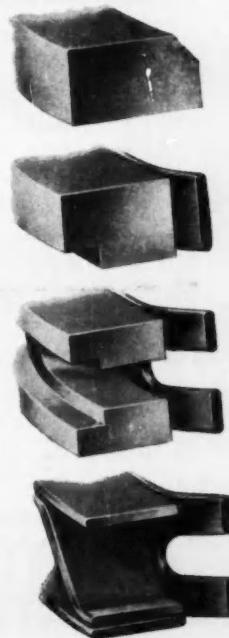
"Made for Each Other!"

SERVICE PISTON RING SETS BY MUSKEGON

Muskegon serves car manufacturers by working with them to design piston rings especially for their engines. By this close collaboration each ring and its companion rings, each set of rings and its corresponding engine are truly "made for each other" and will work smoothly together to produce top performance, mileage, and economy.

Muskegon offers car manufacturers complete service—not only design and engineering, but the most modern facilities for the casting, processing, finishing, inspection, and packaging of Service Piston Ring Sets.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available only through car dealers and other authorized service outlets.



Copyright 1951 by Muskegon Piston Ring Company

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to October 17 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the November 15 issue, page 142, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration between October 17 and November 13.

Included in this latest tabulation, 4384

new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being \$10,016,956,417. These figures are exclusive of cases that are up for later review but included in this list—in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-off.

Certificates listed without a dollar value are those in which a portion of

the facilities involved in the application was completed or acquired prior to Sept. 23, 1950.

— A —

A. R. Adams (Adams Rite Mfg. Co.)
Glendale, Calif.
Aircraft parts—(60)
American Brake Shoe Co., Medina, N. Y.
Aircraft parts—\$1,369,410 (75)
American Measuring Instrument Corp.,
Long Island City, N. Y.
Aircraft parts—\$227,109 (80)
American Standard Products Co., Hartford, Conn.
Aircraft parts—\$325,032 (60)
Aircraft parts—\$197,500 (60)

— B —

Bendix-Westinghouse Automotive Air-brake Co., Elyria, Ohio
Air brake equipment—\$2,555,950 (65)
The Bingham-Herbrand Corp., Fremont, Sandusky Co., Ohio
Turbo-Jet blades—\$1,000,000 (75)
Borg-Warner Corp., Mechanics Universal Joint Div., Rockford, Ill.
Universal joint assys.—\$142,061 (65)
Briggs Mfg. Co., Detroit, Mich.
Aircraft control surfaces—\$1,570,950 (65)

— C —

Caterpillar Tractor Co., Joliet, Ill.
Scraper and bull-dozer—(50)
Clark Equipment Co., Buchanan, Mich.
Ordnance axle housing—\$700,000 (65)
Consolidated Industries, Inc., West Cheshire, Conn.
Aircraft parts—(75)
Aluminum aircraft forgings—\$82,500 (65)
Consolidated Vultee Aircraft Corp., San Diego, Calif.
Airplanes—\$412,771 (65)
Cooper Precision Products, Los Angeles, Calif.
Aircraft fastenings—\$272,696 (60)
The Cornelius Co., Columbia Heights, Minn.
Aircraft parts—\$408,000 (75)
Cummins Engine Co., Inc., Columbus, Ind.
Diesel engines—\$1,100,000 (60)

— D —

Dayton Precision Mfg. Co., Dayton, Ohio
Aircraft parts—\$65,700 (65)
Douglas Aircraft Co., Inc., Santa Monica, Calif.
Airplanes—\$938,079 (65)

— E —

General Motors Corp., Bristol, Conn.
Separators—\$90,782 (65)
General Motors Corp., Dayton, Ohio
Tire parts—\$751,672 (65)
Ordnance parts—\$187,418 (65)
Tire parts—\$320,572 (65)
General Motors Corp., Detroit, Mich.
Ordnance parts—\$100,000 (65)
General Motors Corp., Saginaw, Mich.
Ordnance castings—\$162,000 (65)
General Motors Corp., Vandalia, Ohio
Ordnance parts—\$201,239 (65)
Gerity-Michigan Mfg. Co., Adrian, Mich.
Magnesium castings for aircraft engines—\$237,503 (75)

— F —

H. & A. Tool Co., Detroit, Mich.
Aircraft parts—(50)
Hewitt-Robins, Inc., Buffalo, New York
Fuel tanks—\$53,244 (65)
(Turn to page 94, please)



STRENGTH
RIGIDITY
LIGHT WEIGHT are characteristics of

GUNITE

**cast-
steel
wheels**
for heavy-duty
trucks and trailers

Minimum unsprung weight and maximum strength are engineered into all Gunite wheel designs. You get proven strength and rigidity in the Gunite cast electric-steel wheel.

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WHEEL INFORMATION

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Pre-Assembly Cuts Costs

...IMPROVES PERFORMANCE, TOO!

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Lower costs are certain with SEMS-by-SHAKEPROOF because the costly operation of putting lock washers on screws by hand is completely eliminated.



INTERNAL

Specially designed Shakeproof Lock Washers provide positive vibration resistance.



COUNTERSUNK

The parts are bonded as one, even in flat or oval head screw applications.



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FEATURING SHAKEPROOF LOCK WASHERS WITH TAPERED-TWISTED TEETH!

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Learn why it is important to specify Shakeproof Lock Washers when ordering SEMS—test this better fastener on your own product, now!



HAVE YOUR PRODUCT
"FASTENING ANALYZED"

Let a Shakeproof engineer study your product to see if improved fastening methods can reduce your costs. Write for details, today!



NEW

SHAKEPROOF POWER SCREW DRIVER

It's hopper fed . . . to reduce piece handling and assembly cost! Handles SEMS nuts of any head style as well as ordinary screws and Shakeproof Thread-Cutting Screws. Assures proper tightening torque for maximum fastening efficiency. Write for illustrated folder today!



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DIVISION OF KENNCO TOOL WORKS

3201 North Keeler Avenue, Chicago 29, Illinois

In Canada: Canadair Metals Tools, Ltd., Toronto, Ontario

(Continued from page 92)

Noted auto maker USES Cincinnati WASHER

for "pre-plating" cleaning

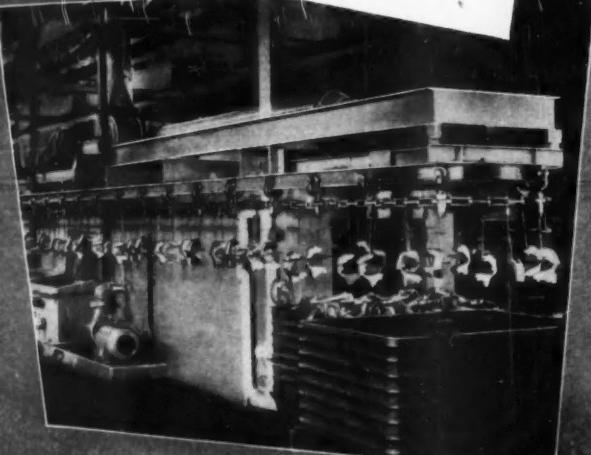
One of the "big-three" auto manufacturers, in one of its divisions, uses this Cincinnati Cleaning Machine to clean radiator grille brightwork before plating. Use of the Cincinnati Machine at this point in the production line graphically illustrates the effectiveness of this scientifically designed equipment.

In a remarkably compact machine, parts receive a one minute wash and a half-minute rinse before being carried on the plant monorail to the plating operations.

Significant savings . . . up to 50 per cent in time, materials and labor . . . have been reported by Cincinnati Cleaning Machine owners. For additional information or a no-obligation survey of your own cleaning problems, call in a Cincinnati engineer. Write today for free catalog.

Cincinnati C

CLEANING AND FINISHING MACHINERY COMPANY
315 Hecla Street, Irondale, Ohio



K
Kaiser-Frazer Corp., San Leandro, Calif.
Airplane parts—\$771,688 (75)
Kenyon Gyro Electronics Corp., Halesite,
L. I., N. Y.
Aircraft Instruments—\$52,191 (70)

L
R. G. LeTourneau, Inc., Longview, Texas
Earth moving equipment—(50)
R. G. LeTourneau, Inc., Peoria, Ill.
Earth moving equipment—(50)
R. G. LeTourneau, Inc., Vicksburg, Miss.
Earth moving equipment—(50)
Ludwig Henold Mfg. Co., Folcroft, Pa.
Aircraft assemblies—\$197,472 (65)

M
Marlin-Rockwell Corp., Jamestown, N. Y.
Aircraft roller bearings—\$2,983,847 (75)

P
Patton Mfg. Co., Springfield, Ohio
Assy. for armored carrier—(75)

S
Solar Aircraft Co., San Diego, Calif.
Aircraft—\$84,527 (75)
Standard Electrical Products Co., Dayton, Ohio
Aircraft—\$80,999 (65)
Stewart Warner Corp., South Wind Div., Indianapolis, Ind.
Aircraft heating equipment—\$130,000 (65)

T
Traxsue & Williams Steel Forging Corp., Alliance, Ohio
Ordnance and aircraft—\$912,035 (65)

U
United Aircraft Corp., East Hartford, Conn.
Aircraft propellers—\$440,477 (75)
Aircraft engines—\$4,159,116 (75)

W
Willys-Overland Motors Co., Toledo, O.
Military vehicle parts—\$482,138 (40)

Drawings Held for Space at Chicago Show

An important preliminary step in preparing the 44th annual Chicago Automobile Show, Feb. 16 to 24, was taken recently when representatives of 20 leading manufacturers of American cars selected spaces for their exhibits. The show is under the sponsorship of the Chicago Automobile Trade Association.

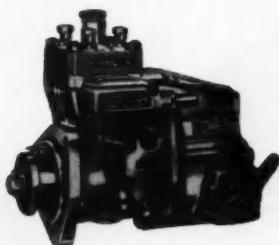
Hunsaker Named Winner of Wright Trophy

The National Aeronautics Association has announced that the 1951 Wright Brothers Trophy will be awarded to Dr. Jerome C. Hunsaker, chairman, National Advisory Committee for Aeronautics. The trophy will be presented to Dr. Hunsaker at a memorial dinner Dec. 17, in Washington, D. C.



In rugged farm tractor service — in blazing heat and clouds of gritty dust — American Bosch PSB single-plunger fuel injection pumps have operated nearly 5000 hours without need for overhaul — the equivalent of 5 years trouble-free service.

PROVED ON THE TOUGHEST JOBS . . . AMERICAN BOSCH PSB fuel injection pump



Tried and proved in the severest service, the American Bosch PSB single-plunger multi-cylinder fuel injection pump is expanding the use of economical Diesel power in fields where automotive-type Diesel engines are particularly adaptable.

Considerably smaller in size and weight than comparable multi-plunger types, the PSB pump uses only a single plunger to serve as many as six engine cylinders — can be more easily serviced in the field — reduces substantially the cost of injection equipment for small Diesel engines — has rolled

up remarkable records of performance in severe service.

The engineering and production techniques that made possible the successful development of the single-plunger injection pump result from over 40 years experience of American Bosch in the design and manufacture of precision products — coupled with a strong research program that leads constantly to new and better contributions to the automotive, aviation and Diesel industries. American Bosch Corporation, Springfield 7, Mass.



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MAGNETOS • GENERATORS • VOLTAGE REGULATORS • IGNITION COILS • ELECTRIC WINDSHIELD WIPERS • DIESEL FUEL INJECTION EQUIPMENT

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How to get production UP



TECHNICAL data on drilling cast iron with twist drills tipped with Carboloy cemented carbide.



NEW, INVALUABLE Carboloy cemented carbide data for defense production.



SLIDE FILMS (at approximate print cost) for visual, in-plant carbide training.

Use STANDARD and CARBOLOY



co-ordinated
carbide control

a practical tested plan
for helping you get
even greater benefits from
the use of carbide tools
in your plant

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BASIC "Triple C" Plan book, part of comprehensive Carboloy Service Program for more effective use of cemented carbides and resultant lower break-even points.

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CEMENTED CARBIDE

**... tool and
maintenance
costs**



CARBOLOY TOOLS CARBIDE SERVICES

Fast-cutting, cost-cutting Standard Carboloy Tools outlast steel tools as much as 10 to 1. They do production jobs more efficiently, and with less maintenance, too, because they are tipped with the finest cemented carbides now produced . . . carbides ever improving in quality as a result of controlled production methods and the Carboloy program of grade improvement.

Best of all, just 11 styles of these Carboloy "Standards" are adaptable for 80% of your turning, facing and boring operations . . . they conserve tools and cut costs because they replace the need for hundreds of

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Bonus tool benefits through Special Carboloy Services

Exclusive Carboloy Services cover everything you should know for more efficient selection, design, fabrication, use and maintenance of cemented carbide tools and dies. Services include tuition-free Customer Training School . . . free technical manuals, charts, catalogs . . . slide films (at approximate print cost) . . . and advice and assistance on your carbide problems from skilled Carboloy engineers.

Write for information, or contact your local Carboloy Sales Engineer or Authorized Distributor, today.

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STANDARD TOOLS
THE QUALITY BRAND

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 62

(Continued from page 90)
a check of back taper on very short threads whose length does not exceed the major diameter of thread. This second check will also indicate presence of lead or angle errors. Both readings

are taken visually on a single dial indicator. The dual thread comparator may be used both for final acceptance gaging in the inspection department or for production checking parts at the machine.

F-129—Potentiometer

A potentiometer circuit that permits measurements of spans as narrow as 100 microvolts has been developed by Minneapolis-Honeywell Regulator Co., Phila., Pa. The narrow span instruments can be used wherever accurate measurements of d-c potentials of the order of microvolts is required, according to engineers of Honeywell's Brown Instruments division. They are said to be applicable for laboratory investigations and for production line measurements of low potential signals in the order of 0.1 microvolt.

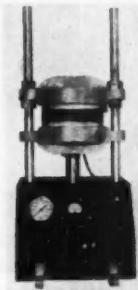
In addition to direct voltage determinations, as encountered in many scientific technical and electronic investigations, the instruments are useful (with appropriate primary measuring elements) for the measurement of differential temperatures, and the determination of slight variations in the temperatures of small objects through the use of radiation pyrometry. Additional applications embracing other variables reducible to d-c potentialities also exist where the high resolution obtainable with narrow span instruments facilitates precise measurement.

Selection of the style of narrow span instrument is determined largely by requirements. If indication only is needed, a precision indicator is the logical choice; if relatively short (i.e., daily) records are needed, the circular chart recorder is satisfactory, and where long sustained records are desired, the strip chart style of recorder serves best.

For control of the measured variable, the circular chart style of narrow span instrument should be employed, with a pneumatic control unit for actuating a diaphragm motor valve or other final control element.

F-130—Laboratory Press

The Hydraulics Div., Wabash Metal Products Co., Wabash, Inc., has announced a 30-ton, model number 30-11, Wabash hydraulic laboratory press.



Wabash laboratory press, model 30-11.

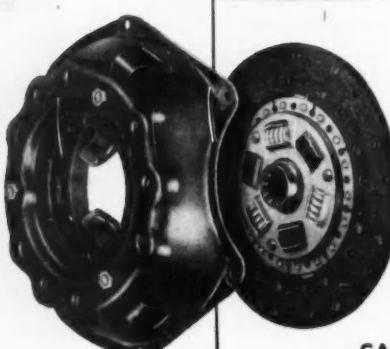
A hydraulic mechanism provides a total available force of 60,000 lb. A quality gage, mounted in the control

(Turn to page 148, please)

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BORG & BECK®

means . . . CLUTCHES built to the exacting standards which have made the name BORG & BECK famous for 36 years!



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CAN DEPEND ON

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CLUTCHES... FOR THAT VITAL
SPOT WHERE POWER TAKES
HOLD OF THE LOAD

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Take-off from the performance facts of SuVeneer Clad Metal . . . into a new realm of design opportunities for superior product economy and service! SuVeneer Clad offers the surface advantages of solid copper (or copper alloy,) plus the inherent physical properties of low carbon steel to which it is inseparably bonded—giving a free hand to fabrication by any usual method. We have a useful bulletin on the physical properties of *SuVeneer Clad Metals*—write for it. And we'll gladly consult with you on your future planning.

(Advertisement)

HEAVY-DUTY SUNOCO DYNALUBE GIVES ALL-WINTER PROTECTION



Meets or exceeds car manufacturers' recommendations for all new passenger cars.

*Flows Freely
'Way Below Zero
Assures Instant
Lubrication
Helps Quick-
Starting
Reduces Load
on Battery*



CERTIFIED
for
**LONG MILEAGE
ENGINE CLEANLINESS
LONG ENGINE LIFE**

HEAVY-DUTY, FULLY DETERGENT-DISPERSANT

NEW Sunoco Dynalube is a remarkable new *heavy-duty* motor oil that actually improves the condition of most engines. Its *fully detergent-dispersant* action not only cleans engines, it keeps them clean by holding road dust and contamination in suspension until oil is drained at the regular interval.

CALENDAR

OF COMING SHOWS AND MEETINGS

1952

Brussels Automobile & Truck Show, Brussels, Belgium	Jan. 19-30
2nd National Motor Boat Show, New York City	Jan. 11-19
Plant Maintenance Show, Phila., Pa.	Jan. 14-17
SAE Annual Meeting, Detroit, Mich.	Jan. 14-18
Society of Plastics Engineers, Inc. (eighth annual technical conference), Chicago, Ill.	Jan. 16-18
Truck-Trailer Manufacturers Association (11th annual meeting), Houston, Texas	Jan. 28-30
American Society for Metals Midwinter technical meeting, Pittsburgh, Pa.	Jan. 31-Feb. 1
19th Chicago National Boat Show, Chicago, Ill.	Feb. 1-10
Automotive Accessories Manufacturers of America Exposition, New York, N. Y.	Feb. 4-7
Chicago Automobile Show, Chicago, Ill.	Feb. 16-24
National Transport Vehicle Show & Fleet Maintenance Exposition, New York	Feb. 26-28
Pacific Automotive Show, Los Angeles, Calif.	Feb. 28-Mar. 2
Amsterdam Automobile Show, Amsterdan, Netherlands	Feb. 29-Mar. 10
ASTM Spring Meeting, Cleveland, Ohio	Mar. 2-7
SAE Passenger Car, Body and Materials Meetings, Detroit, Mich.	Mar. 4-6
Fifth National Plastic Exposition, Phila., Pa.	Mar. 11-14
ASTE Industrial Exposition, Chicago, Ill.	Mar. 17-21
Geneva Automobile & Truck Show, Geneva, Switzerland	Mar. 20-30
American Society of Lubrication Engineers, Seventh Annual Meeting and Lubrication Show, Cleveland, Ohio	Apr. 7, 8, 9
SAE Aerodynamic Meeting, New York, N. Y.	Apr. 21-24
Turin Automobile Show, Turin, Italy	Apr. 23-May 4
International Foundry Congress and Show, Atlantic City, N. J.	May 1-7
API Div. of Refining, San Francisco, Calif.	May 12-15
American Society for Quality Control (sixth annual meeting), Syracuse, N. Y.	May 22-24
SAE Summer Meeting, Atlantic City, N. J.	June 1-6
American Society for Testing Materials (annual meeting), New York City	June 23-27
SAE West Coast Meeting, San Francisco, Calif.	Aug. 11-13
American Standards Assn. Third National Standardization Conference, Chicago, Ill.	Sept. 8-10
Instrument Society of American (sixth annual meeting), Cleveland, Ohio	Sept. 8-12
SAE Tractor Meeting, Milwaukee, Wis.	Sept. 9-11
Paris Automobile Show, Paris, France Oct. 2-12	
27th International Motor Exhibition, London, England	Oct. 15-23



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**YOUR DUST and FUME CONTROL SYSTEM
properly protects the health, safety
and efficiency of your employees?**

Even though you believe you have adequate protection in your plant, it will be well worth your time to investigate the many advantages in the collection and disposal of dust and fumes offered by Centri-Merge completely automatic equipment.

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units collect dust and fumes as soon as they occur, clean and scrub them from the air on a swirling tornado of water, permanently trap them under water for quick and easy disposal as sludge.

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dust and fume control equipment is engineered and design adapted to your specific requirements. It gives non-fluctuating cleaning efficiency every minute of the day, never requires a shutdown during working hours for cleaning or routine maintenance, eliminates health or fire hazard from dust and fumes, safeguards employee efficiency.



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THE best AIR PURGE
is CENTRI-MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers

Metbond Process for Joining Metals

(Continued from page 49)

two phase bond could be produced utilizing two basic materials possessing different physical characteristics. Compared to each other, one of the materials had a high, hot viscosity in the uncured state and became an elastomer upon completion of cure. Natural rubber, neoprene and hycar are examples of this material. The second material comprising the two phase system possessed a low, hot viscosity in the

partially polymerized or cured state and was transformed to a tough semi-rigid solid when fully polymerized. Phenol formaldehydes, melamines and urea formaldehydes are but a few representing this type of material. An example of the type of bond being described would be one which utilizes as the adhesive film an unvulcanized rubber type surface coated with a rigid type phenolic resin. Upon interposing

this tape between two imperfectly matched faying surfaces and applying heat and pressure, the majority of flow would be experienced by the phenolic component. Further, upon complete cure of the two components, the phenolic will be more rigid than the rubber so that when the joint is stressed the major portion of the deformation will be experienced by the rubber. Although the described positioning of the materials may not be entirely correct, it may be seen that a rigid adhesive complemented by a flexible adhesive theoretically affords a means of joining poorly mated surfaces with a minimum of stress concentration.

The present Metbond process utilizes the above basic principles with certain modifications. It has been found desirable from a mechanical standpoint to position the two adhesive materials in tape form such that the component (designated N2) possessing maximum flow characteristics is within the tape while that component (M3C) having minimum flow properties is the outermost element. This is accomplished by the utilization of a glass fibre or nylon cloth as a carrier for the adhesives. The flexible metal adhesive, M3C, establishes a bond to the metal surfaces. The low-pressure adhesive, NZ, which is thermoplastic prior to cure, equalizes pressure by filling small irregularities resulting from imperfectly matched parts or imperfect tools.

To explain the capabilities of the Metbonding process, reference should be made to some of the more important physical and chemical factors influencing adhesive action. These may be grouped broadly into physical and chemical reactions. Briefly, these are listed as follows:



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WISE BUYERS benefit from the provisions of the HSM Plan for all pyrometer supplies purchasing. Just like the buyer shown above in a discussion of thermocouple extension wire with Bud Tovig, Honeywell Supplies Man from our New York office.

The HSM Plan includes a realistic survey of your pyrometer supplies requirements, a listing of the specific items such as thermocouples, protecting tubes, extension wire, charts, etc., a breakdown according to planned and periodic pur-

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- | Physical | Chemical |
|--|---|
| 1. Surface tension characteristics of the adhesive. | 1. Acidity and/or alkalinity of glue line during and after polymerization. |
| 2. Characteristics of surfaces being joined: porosity and smoothness. | 2. Formation of by-products during polymerization. |
| 3. Characteristics of adhesive film: tensile strength, shear strength, modulus, etc. | 3. Characteristics of surfaces being joined: polarity, retention of oxide films and glue films. |
| 4. Glue line thickness: porosity, continuity, evenness, etc. | 4. Retention of volatiles within glue line. |
| 5. Application methods. | |

Surface tension characteristics of Metbond Tape are such that satisfactory bonds can be made to clean metal surfaces without the necessity of primers. By proper maintenance of volatile contents within the adhesives,

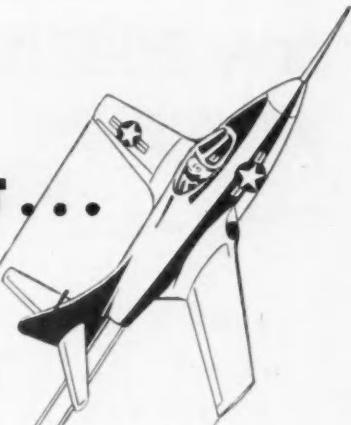
(Turn to page 104, please)

MINNEAPOLIS
Honeywell
Brown Instruments

SKY'S THE LIMIT . . .

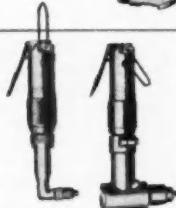
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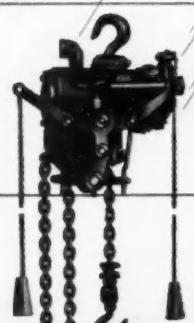
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Over thirty aircraft sizes of Angle and Straight Nut Runners for precise torque control for jobs from a #10 screw to $1/2''$ bolt size.



HOISTS

Over thirty-five sizes for loads from 200 to 20,000 lbs. Complete speed control from a smooth crawl to full speed. Two types available, overhead for lifting, and utility for hauling or hoisting.

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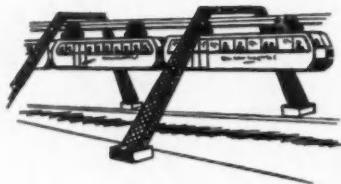
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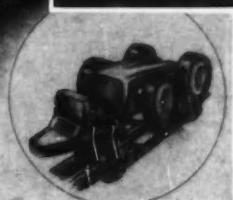
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The FIRST monorail



Development of the unique single track railroad car, balanced by gyroscopes, was started by the Englishman Louis Brennan in 1896. Never in wide use, it nonetheless led to many further applications based upon the principles thus developed.

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under-floor type towing conveyors

This continuous chain conveyor runs in a steel

slot below the floor. There is nothing to obstruct. A simple towing pin device is attached to any standard 4-wheel truck or trailer, 2-wheel truck with dolly, and operator either engages or disengages by lowering or raising the pin. When the pin is dropped into the slot, the trolley attached to the Webb Drop Forged Rivetless Chain picks up the load automatically. This original Webb development — The Towveyor — offers great speed and efficiency for handling boxes, packages, barrels, tote boxes, parts, etc. Loading and unloading can be done at any point. The Towveyor System is flexible — trucks may be added, disengaged or side tracked, as desired.



Metlbond Process

(Continued from page 102)

the use of moderate curing pressures (100 psi) at 320 F will produce sufficient flow and lessen surface tension to the point where adequate wetting of the metal surfaces may be achieved. In the majority of cases, however, the fabricator is extremely concerned with the possibilities of using lower curing pressures ranging from contact pressure to 50 psi. Under these conditions it has been found desirable to prime the metal surfaces with a thin film (0.001 to 0.0015 in.) of the neoprene type adhesive component. In this case a liquid adhesive may be employed over which control of viscosity may be exercised so as to assure maximum wetting. Where surfaces have been properly primed, lower curing pressures may be employed which represent appreciable savings in equipment costs.

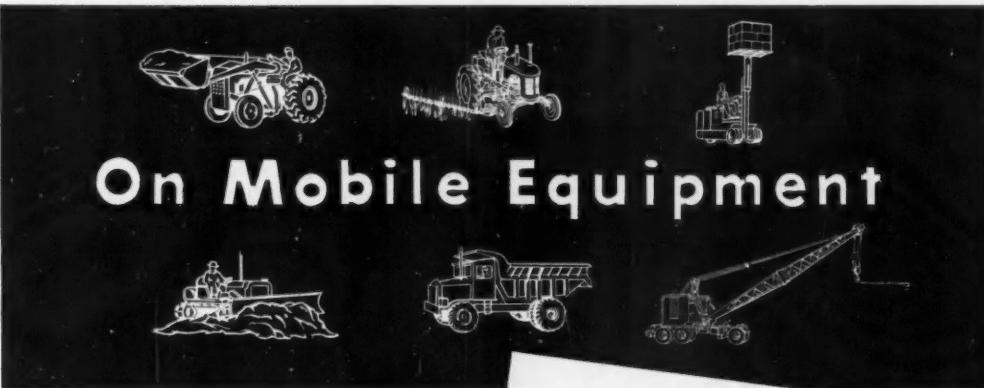
Numerous experiments have been conducted relative to types of bonds available with different thicknesses of glue lines. Data are available which substantiate the fact that thin glue lines are in general stronger than thick ones. This is undoubtedly explained by the fact that there are higher probabilities of "weak" links in thick joints.

Recognition of the importance of glue line thickness and viscosity control has further promoted the use of tape type adhesives, such as Metlbond. Such adhesives are made attractive to the fabricator because the factors over which he must exercise control are minimized. The combination of a semi-rigid and a flexible resin offers an adhesive possessing superior physical properties, and the fact that it is available in tape form renders it superior from a fabrication standpoint both with respect to ease of application and with respect to the number of factors requiring control by the fabricator.

As described above, the Metlbond process is a simple one. One of the greatest problems to be considered, however, is the education of personnel to recognize those conditions which might prove undesirable to the Metlbond process. Not only is the ability to recognize mandatory but methods of eliminating or remedying such conditions must be completely understood. Some of the more common difficulties which are very often overlooked in attempting to answer the question, "Why did the bond fail?" are as follow:

1. Improper methods employed for cleaning metallic surfaces.
2. Carelessness in priming operations.
3. Insufficient drying of prime coats.
4. Inadequate facilities for handling or storing primed metal components.
5. Inadequate facilities for storing liquid and/or tape adhesives.
6. Disregard for the maintenance of controls necessary throughout the

(Turn to page 106, please)



On Mobile Equipment

These Vickers Balanced Vane Type Pumps are especially designed and built for the severe service encountered with mobile equipment.

Their design automatically compensates for wear throughout pump life. Correct clearances are maintained continuously so that efficiency and delivery rate remain high. As a result, it is not necessary to select a larger pump to allow for loss of delivery under normal service conditions.

Hydraulic Balance . . . an exclusive feature of Vickers Vane Type Pumps for many years . . . eliminates pressure-induced bearing loads, providing longer life and less maintenance.

These Vickers Pumps are available in three basic sizes (shown at right) with a total of ten nominal delivery ratings and a variety of mountings. By unbolting and rotating the pump head the outlet may be placed parallel, opposite, or at right angle in either direction to the inlet. This greater adaptability to individual requirements means easy and inexpensive installation.

For additional information about these pumps (also double pumps) write for new Catalog M-5100. There is a Vickers Application Engineer near you who will be glad to discuss your hydraulic pump problems.

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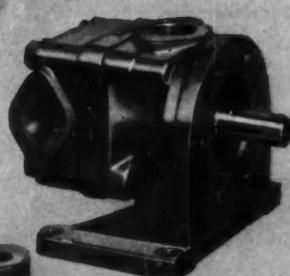
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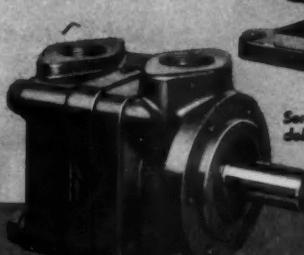
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and Last Longer...
AT
LOWER OVERALL COST*



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delivery ratings—2 to 11 gpm.



Series V-300 pump made in 4
delivery ratings—12 to 24 gpm.



Series V-400 pump made in 2
delivery ratings—28 and 36
gpm.

Metibond Process for Metal Joining

(Continued from page 104)

Metibonding process i.e. pressure, temperature and time necessary to achieve ultimate physicals from materials being processed.

One of the greatest disadvantages to the Metibonding process, and indeed to any organic bonding process, is the lack of means to perform non-destructive tests. Until further research is conducted to determine complete and efficient testing methods, it will always be

mandatory to exercise all possible control over bonding procedures to assure uniform results.

Although Narmco, Inc., has performed considerable research on organic adhesives, both in liquid and tape form, Consolidated Vultee Aircraft Corp. pioneered the use of Metibond adhesives from a production standpoint. (See AUTOMOTIVE INDUSTRIES, August 1, 1950.) An important factor in the

B-36 bomber's performance is due to the use of the Metibonding process.

Without the Metibonding process, magnesium could not be used to the extent it is today. Its brittleness and resulting failures at spot welded or riveted joints necessitates the Metibonding process. Further, there is always the tendency for corrosion where magnesium is joined to other materials when metallic or mechanical means of attachment are used. Metibond adhesives not only possess high insulating and anti-corrosive properties, but their ability to absorb shock loads, due to its high internal hysteresis (energy absorption), is extremely advantageous. This latter characteristic permits damping of the vibrational tendencies of metal components, thus increasing the fatigue life of the metal itself. The fatigue life of Metibonded components quite often exceeds by a factor of ten the life of similar metal components which have been either riveted or spot welded, and as far as is known, no production part in service has ever failed due to a Metibonded joint. The above summarizes generally the answer to the three basic questions previously posed.

In addition to the above, potential users of Metibond are naturally desirous of answers to many questions pertaining to the physical properties of Metibonded joints. Some of the more important data are therefore included in the accompanying graphs.

Questions remaining as to initial cost involved in adopting the Metibond process are extremely difficult to answer in that much depends upon the articles to be manufactured, the quantity of parts involved and the particular facilities available to a company prior to its entrance in the Metibonding field. Needless to say, it is necessary to have adequate cleaning facilities, spraying equipment and/or dip tanks, ovens, presses or vacuum facilities, and many other pieces of equipment standard to most fabricators of metal components. Proper use of such equipment is no small problem.

The fact that references thus far have been made to the aircraft industry should not be taken to mean that other industries are not utilizing the Metibond process. The Fire Control Division of the Army Ordnance Dept. has investigated the possibilities of Metibond adhesives and is currently specifying their use to various optical manufacturing companies for the bonding of glass to metal components. Metibond has proved to be particularly advantageous in those cases where high thermal, as well as mechanical, shock is experienced. Further, the Naval Electronics Laboratory has found Metibond of particular importance in fabricating sandwich structures. In these cases high strength bonds are required. Not only must the glue lines possess adequate mechanical strength, they

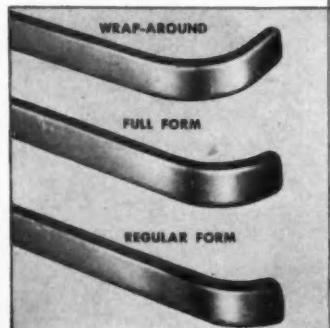
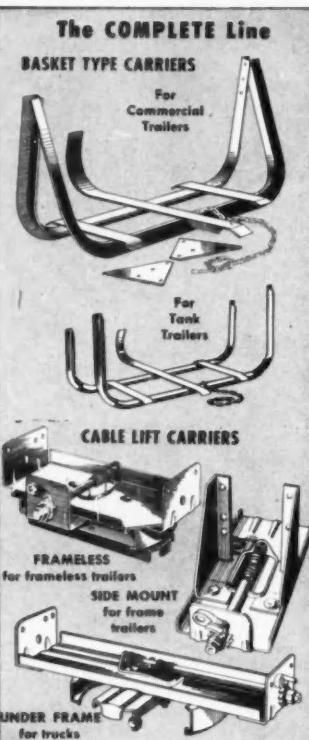
(Turn to page 108, please)

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From the complete Nash line you can choose exactly the right types and sizes of tire carriers for your trucks and trailers. All Nash Tire Carriers handle tires easily and carry them securely in transit. Light in weight, rugged and durable, Nash Tire Carriers are top values both as original equipment and for replacement installation. Easy to install.

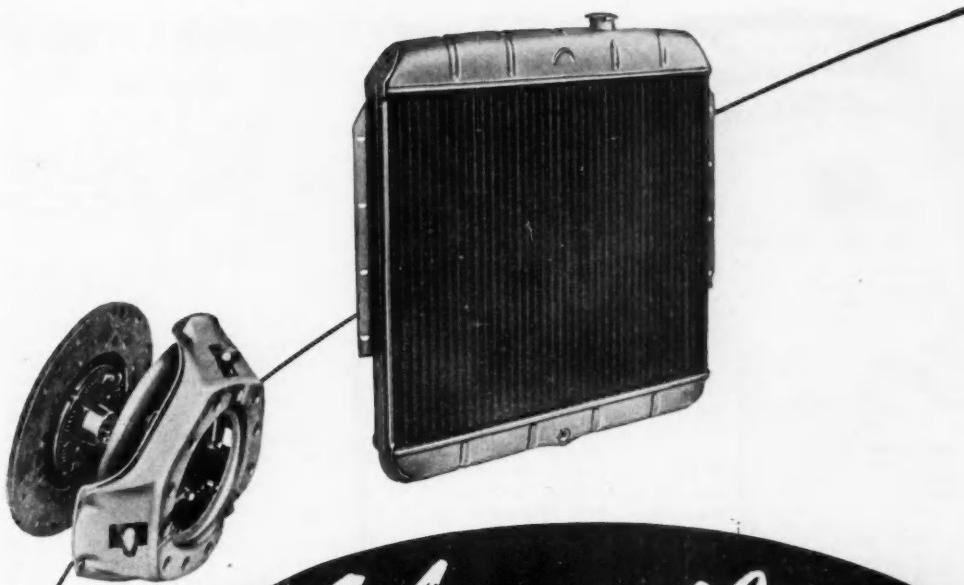
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Our engineers have the ability and vision to "see" the answers to design problems. Our manufacturing flexibility permits quick translation of these answers into finished units.

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LORD MOUNTINGS improve product performance

PLATE FORM—STANDARD

Isolate steady-state vibration. Stable, compact—easily installed. Loads 1/2 to 120 pounds per mount.

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Isolate vibration from all directions. Light in weight, small in size, they are widely used to mount electronic equipment.

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PLATE FORM— VERTICAL SHOCKING

Isolate steady-state vibration plus severe shock. Loads up to 610 pounds per mount.

TUBE FORM—STANDARD

For steady-state vibration and occasional shock. Have great radial stability. Loads from 1/2 to several thousand pounds.

FLEXIBLE COUPLINGS— F. H. P.

Have exceptional torsional softness . . . accommodate parallel and angular misalignment. Ratings from 1/50 to 1 hp.

TUBE FORM— VERTICAL SHOCKING

Isolate steady-state vibration and severe shock. Recommended for mobile equipment.

CHAN-L-MOUNTS

Ready to use—easy to install. Isolate steady-state vibration and occasional shock. Extremely soft and sturdy, they give superior isolation.

FLEXIBLE COUPLINGS— M. H. P.

Have exceptional torsional softness to isolate torsional vibration. Removable flexible elements allow installation without moving hubs. Ratings to 100 hp at 1750 RPM.

SHOCKMOUNTS

Isolate noise and vibration from punch presses, looms, printing presses, etc. Neoprene resists attack by oil and grease. Load ratings up to 7500 pounds per mount.



VIBRATION CONTROL
MOUNTINGS AND
SHOCK ABSORBER PARTS

LORD MANUFACTURING CO., ERIE, PA.

Metibond Process

(Continued from page 106)

must also be non-porous under extremely adverse conditions.

It appears that the Metibond process also has numerous applications in the automotive industries. Specific examples would be the bonding of stiffening elements to formed sheets, brake linings to shoes, etc.

It is not intended that this article convey the idea that Metibond is a panacea. The aircraft industry in particular is desirous of receiving improved bonding materials which will have higher heat resistance, lower curing temperatures and pressures, and be capable of application in general at lower costs. Improvements such as these are continually being investigated by research personnel. Still in the laboratory stage is a new high temperature adhesive which appears to be capable of withstanding temperatures 100 F in excess of present Metibonds. Unfortunately, time will be required to run the full gamut of tests to determine whether these new adhesives have any weaknesses which might make them unsatisfactory in production. An increase in the use of organic adhesives certainly can be expected as their properties become more widely known and as improved materials are developed.

Metibond is trade mark of Narmco, Inc.

GM to Aid Dealer Public Relations

General Motors Corp. has developed a comprehensive public relations program outlining for its dealers suggested techniques for improving their public relations. An attractive multi-color booklet, entitled "How GM Dealers Can Make More and Better Friends," covers two broad classifications: relations with customers in the dealer's own establishment, and the general area of community relations. Included in the brochure is a review of GM material available to dealers, such as films and literature for public distribution. It also points out other activities that will strengthen the dealer's position in the community.

Ford Sees 1952 As Good Year

At a recent meeting of the board of directors in the new \$35 million stamping plant near Buffalo, N. Y., Henry Ford II, president of the Ford Motor Co., predicted that 1952 will be a good business year with the company producing and selling all the cars which the Government will allow it to make. The meeting marked the first time that the directors have met in a Ford plant outside the home-office area in Michigan.

Wherever "Specs" call for **DEPENDABILITY...**



BCA BEARINGS are the standard

The U. S. Army Ordnance Corps' "Eager Beaver" is a truck that has weathered the worst—deep water, mud, heat, cold, dust, steep grades, rocky roads.

Built by Reo to specifications that are really tough, every part of these trucks was selected to withstand the most severe kind of beating. That's why BCA Bearings "or equal" were specified by the Spicer Division of Dana Corp., suppliers of the transmissions and clutches.

BCA Bearings are performance proved. They have an enviable record for dependability, economy and long-life . . . they are original equipment on many trucks, buses, cars and tractors . . . they are the first choice of design engineers with critical specifications.

Whatever your bearing requirements—transmission, clutch, differential, wheels, generators—specify the best . . . BCA Bearings.



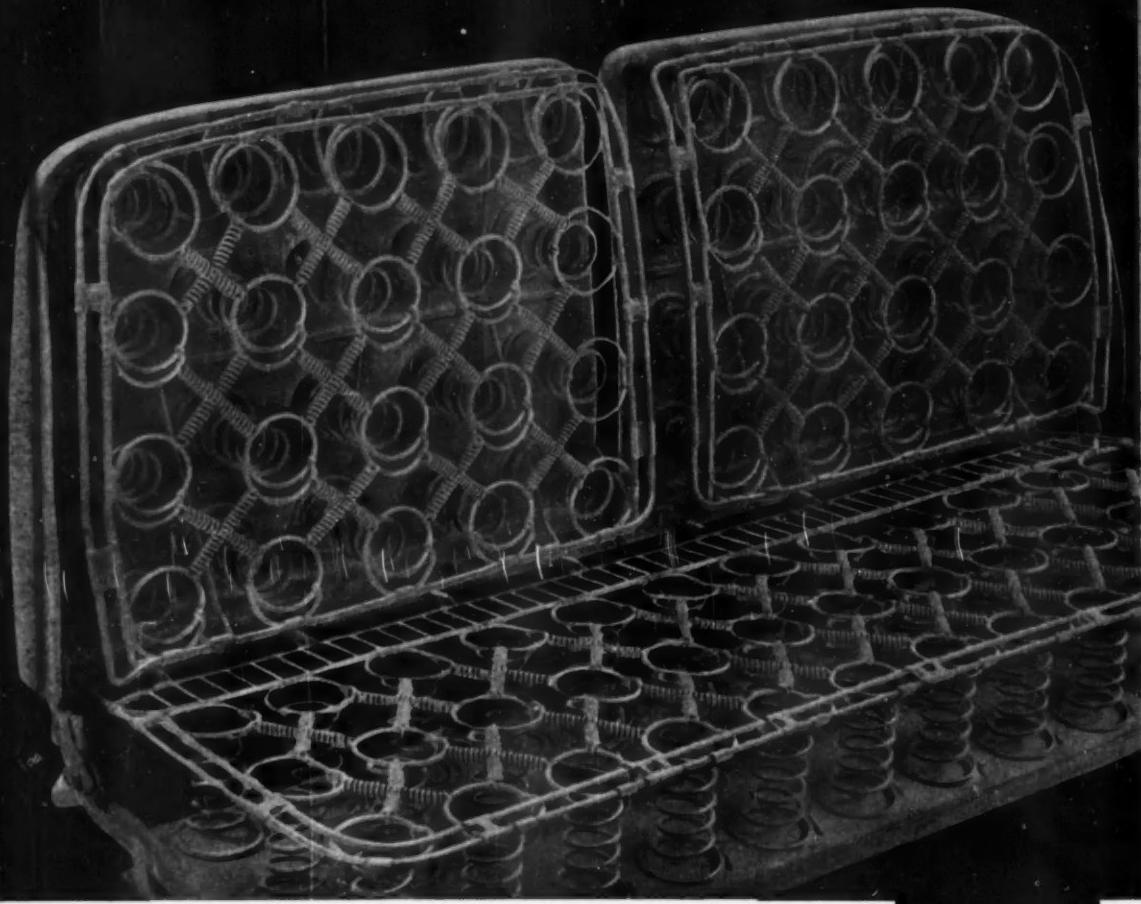
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Ready for Upholstering and Installation in the Car!

This radical new major development for factory installation in America's automobiles is definitely a revolutionary, enthusiastically received achievement in greater riding comfort at lower cost! To make this new design possible, L. A. Young Spring & Wire Corporation, for the first time is now producing steel tubing to make the seat and

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End view
of complete
front seat,
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assembly



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Leeds, Ala. • Los Angeles and San Leandro, Calif. • Windsor, Toronto and Montreal, Canada

Aluminum Cylinder Heads

(Continued from page 35)

selected was Alcoa brazing alloy 718, which has a critical temperature melting range between 1080-1085 F and in thin sheet form lends itself well to the production of the stamped brazing gaskets. The thickness of the gasket material is dependent on the size of the unit involved and the strength required in the joint. Sufficient metal was added by using the thin aluminum gaskets to form fillets and completely seal the unit without filling the interpassages.

Alcoa No. 33 Brazing Flux was used to permit the filler metal to wet completely the exposed joining surfaces of the cylinder head sections. No. 33 is a general purpose flux with the lowest melting point of all Alcoa fluxes and is especially effective at brazing temperatures around 1100 F or below. Chemically, it is the most active Alcoa flux and permits a maximum flow of filler metal.

The cylinder head slices and the filler

metal gaskets were prepared for brazing by a cleansing with a mild caustic etch followed by a cold water rinse, a nitric acid dip and a final rinse in hot water to facilitate drying.

The parts were then fluxed and assembled with the correct brazing sheet gasket being placed between slices. Alcoa 2S pins were used to hold the assembly in alignment during the brazing process. These pins were located in stud bosses which were drilled out in a final machining operation. In order to furnace braze the assembly successfully and to control its final dimensions with the required accuracy, it was necessary to provide a definite separation between the parts to be joined. To maintain the required separation during the brazing of the cylinder head, Alcoa 2S washers were used.

The assembled and fluxed unit was placed in an electrically heated furnace and brought up to the brazing temperature of 1085 F in approximately 18 minutes. The cylinder head assembly was then removed from the furnace and permitted to cool in air to about 900 F before quenching in 180 F water. This cooling cycle was included to prevent distortion during quenching and to allow the molten brazing material to solidify. The above quench removed a major portion of the flux, but to insure complete flux removal the brazed assembly was given a 15 minute bath in nitric acid of 58 per cent concentration at room temperature, followed by a hot water rinse. The cylinder head was then water tested at 70 psi to verify anticipated joint tightness.

The results of laboratory static tensile and fatigue tests conducted on furnace brazed joints in Alcoa alloy C612 compare favorably with those of conventional test specimens in the same alloy. Test results showed the furnace brazed joints to have about 75 per cent of the strength of the parent metal in static tensile strength and 70 per cent of its fatigue strength. Greater joint strength can be obtained by increasing the joint area over wall thickness by beading. Dynamometer and road testing of aluminum cylinder heads and cylinder blocks produced by this combination process have demonstrated no failures in the brazed joints or in the parent metal.

Under a mass production setup, it is believed that the sandwich designed, furnace brazed aluminum cylinder head will prove to cost much less per piece than conventional sand or semi-permanent mold cast units. It is estimated that the final cost will approach that of similar cast iron units.

ORIGINAL EQUIPMENT ON MANY LEADING CARS AND TRUCKS

DOLE

Thermostats



Thermostat Suggestion:

To Automotive Engineers—

- Remember that Dole Thermostats are different in principle and performance.
- It was the advent of the new Dole Thermostat that made feasible the smaller radiators and the sealed cooling systems.
- Dole Thermostats are designed to give top performance on the new cars with high pump pressures.
- Plan and specify Dole Thermostats for both today's cars and those on your drawing boards.

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It's significant that the big die shops prefer Clearing presses for proving the quality of their work. Satisfactory completion of most big die contracts requires actual performance; a certain number of pieces formed on the dies are carefully inspected by the customer before approval is given.

Frederick Coleman & Son, Inc., of Detroit, run try-out operations on the four-point Clearing shown in the photo. They know they get precise press action, and the precision dies they make will therefore produce acceptable pieces.

If you want to be sure of precision in your production, if you want fewer rejects and less scrap, you can put your faith in Clearing. A Clearing engineer will be glad to tell you exactly why.

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Send blue prints, drawings, samples or your order to Camcar today and ask us to show you how you, too, can be sure of continuous assembly supply. Don't be without parts. Get them from Camcar.



Chrysler

(Continued from page 56)

angle from 30 to 40 deg. This gives more resistance to the thrust of the drive pinion, which decreases the end play and deflection.

A new steering gear column ball-bearing (spring loaded) replaces the bushing previously used. Normal variations, occurring within the bearing, are automatically compensated, assuring freedom from binding or rattles resulting from loosening.

Quieter operation of the Oriflow shock absorbers introduced as standard equipment on all models in 1951 is attained by refinement of the piston and base valve assemblies, permitting a more gradual change in the velocities of the fluids at the discharge ends of the orifices.

Two exterior appearance changes result from the use of new wheel covers and a new tail light. In all except the Imperial and Crown Imperial models, the ornamentation of the wheel cover is limited to a beaded ring just inside the tire valve opening and a raised center hub incorporating three concentric stepped rings. The wheel cover is of stainless steel. In the Imperial and Crown Imperial, instead of having the centered crown mounted on a smoothly curved surface, it is set in a depression three in. in diameter.

The new tail light used on all models save the Imperial and Crown Imperial projects from the fender and contains an integral back-up light. The two separate back-up lights used on 1951 models thus are eliminated. The upper two-thirds of the tail-light housing is occupied by a combination, tail, stop and directional light with a red lens. At the bottom of this section on the center line of the tail lamp housing is a small red reflector button. The lower section of the tail lamp housing, which projects somewhat farther from the fender, is a clear back-up light.

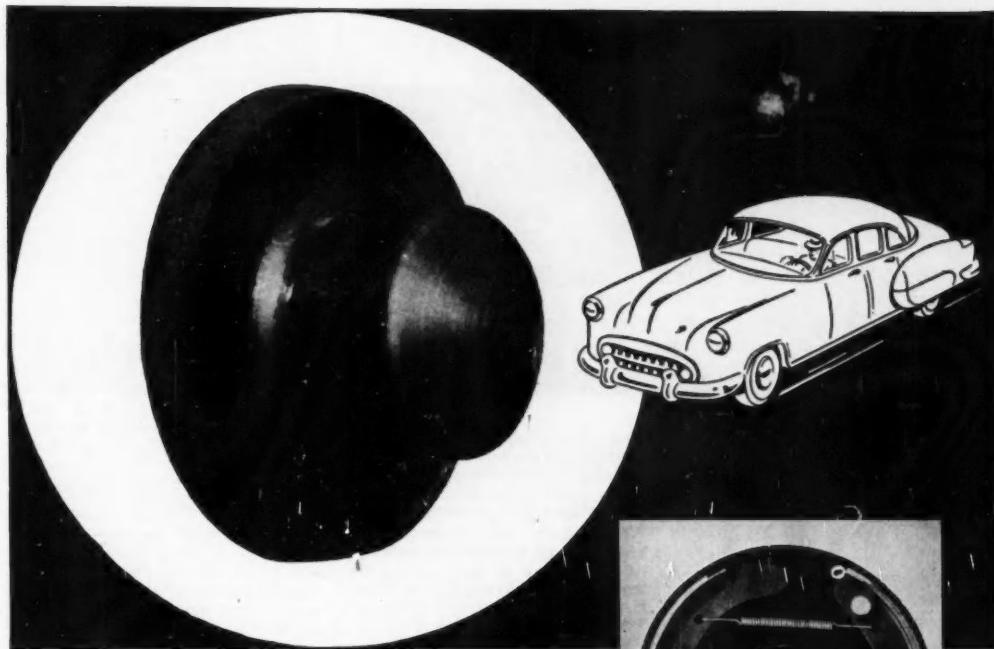
Dual-Range Hydra-Matic

(Continued from page 37)

exhausted so the front servo release oil can move the piston to released position.

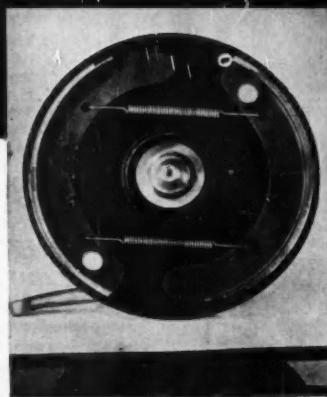
The rear servo is redesigned to allow faster rear band application in "Lo" range. This improves rocking control by speeding "Lo" and "R" engagement by supplying "LO" range oil from the manual valve to a new rear servo exhaust valve, allowing rapid exhaust of rear servo release oil. When "Lo" range oil is not applied to the exhaust valve, a spring holds it closed.

What's U. S. Rubber doing to eliminate brake squeaks?



Located under the vertical leg of a brake shoe, this tiny button or snubber prevents metal-to-metal friction and thereby eliminates squeaks. Made of Enrup, U. S. Rubber's versatile plastic, the button wears better than metal in this application.

It is a typical example of how "U. S." experts work with original equipment manufacturers to add to the efficiency and consumer satisfaction of their products.



THE HIGH IMPACT resistance and greater abrasion resistance make Enrup valuable on the brake shoe. The button stands up under the high temperatures generated in the brake during rapid deceleration.

PRODUCT OF
U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY
ENGINEERED RUBBER PRODUCTS • FORT WAYNE, INDIANA

The Effects of Steel Quality On Body Design and Fabrication

At a meeting of Detroit Section, SAE, last month, discussion centered upon the effect of sheet steel quality on body design and body fabrication from the viewpoint of the user; and the problems of the steel producer in meeting these requirements. E. S. MacPherson, Ford Motor Co., discussed the user's viewpoint, while H. J. Cutler, Bethlehem Steel Corp., described the

present state of the art in the steel mill.

In his discussion, Mr. MacPherson said that the weight allocated to those components made of sheet metal in a car amounts to perhaps 25 to 30 per cent of the total and sheet metal in the body represents more weight than any other component of the car.

What the total weight of body and

sheet metal can be held down to, and also its cost held down to, will be somewhat governed by available selections of sheet metal gages and what tolerances have to be taken. Tolerances on commonly used gages are about 10 per cent. This 10 per cent tolerance could amount to about 60 lb on the average car.

With 3000 to 4000 parts in a car, an average of one or saved per part could mean 186 to 250 lb saved on the overall car. Lesser gage tolerances, therefore, are certainly desirable, according to Mr. MacPherson.

In wide sheets it is often found that the sheet thickness seems heavy at the center. The thickness existing near the edges of the sheet may be the minimum required by the structural design or processing in the dies. The extra thickness near the middle, therefore, represents excess weight in the car and is undesirable.

He said that it is also found that in sheet steel coils the gage will vary along the length of the coil. Here again the gage may be the minimum required for the structural design. The parts made out of the thicker portions of the strip end up in the car with excess weight. The parts of the coil being to a certain thickness may process well in the dies, while the thicker pieces may not work well in the dies, or at best, require frequent adjustment of presses, thus adding to piece cost.

In the matter of drawing quality in the steel, the justification of premium required for this steel is open to question. They should cost as little as possible. The availability of good drawing quality steel with less or no premium would help.

Variation in drawing quality is another cause for complaint. Even after the premium for drawing quality steel is paid, it is found that there are variations in its drawing quality. Too often it is found that, after sheets have been blanked, they have inadequate drawing quality and must be salvaged. Line operations are at times interrupted and delayed until proper steel can be obtained. These things end up as extra cost in the car.

Thinner steel of good deep draw quality at no extra cost per lb would be desirable. Where 20 gage is used it would be advantageous to use 21 gage and have it draw as well as the 20 does now. It can be said that, the better the drawing quality, the thinner the sheet that can be used and the less the weight and car cost.

Mr. MacPherson said that another item which adds to the cost is scrap, which is the result of faulty characteristics and surface impurities in the steel sheet. This may be caused by improper cropping of the ingots, leaving impurities in the cropped ingot which later appear in the rolled sheet. So-called "conversion steel" is also at times the cause of excessive scrap loss. With this steel, the operations required to go from the ingot to the finished

(Turn to page 184, please)

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"ON THE DOUBLE"**

with the

**Chicago
"214" DOUBLE
RIVET SETTER**



The "214" automatically feeds, inserts and clinches two rivets at a time...with speed that may mean a big saving in your fastening costs.

14" throat makes large assemblies easy to handle. For tubular rivets as large as $\frac{5}{16}$ ", or less in length. Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility.

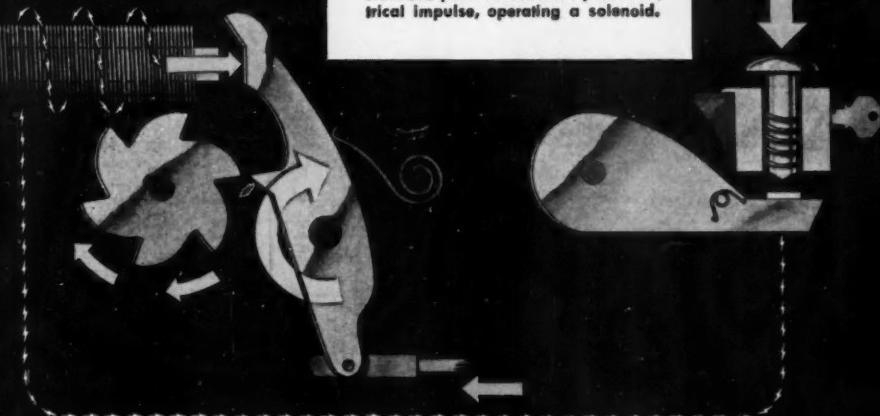
Ask us how the "214" can help you cut costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.

FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

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... in which motion is transmitted
from one point to another by an elec-
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If it needs to behave like a latch, a lock, or a linkage...
we can create it...mass produce it...WITH STAMPINGS!



Above you see a special locking mechanism designed for electrical operation of an automobile door. It is one in which our research and engineering ingenuity have been applied to meet a specific need...for General Motors' experimental Le Sabre car. The forward-looking design of Le Sabre suggests the type of engineering approach which we apply to special motion problems.

Your problem may be different. You may want a locking or latching device that can be operated manually instead of electrically. Or you may want a combination of both.

Whatever the problem, we can design and produce a motion device to fit *exactly* the needs of your job.

Because we can make precision stampings of uniformly high quality—and machine-assemble them in large volume, we are able to keep the cost unusually low.

For any type of motion device, for either civilian or military equipment, we can assist you on development work and design—often save you money on production. Write for a copy of our booklet, "We Make Motions".



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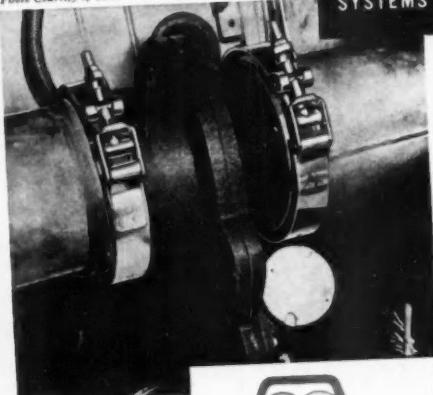
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WE MAKE MOTIONS

ENGINEERS NOTEBOOK

Photo Courtesy of Industrial Design Laboratories

HEATING SYSTEMS



MARMAN

V-Bands and integral welded flanges simplify duct coupling on Globemaster

An ideal arrangement for coupling iris-control valve in by-pass heating duct of the Douglas C-124 Globemaster II is achieved with a standard Marman V-Band Coupling and integral welded flanges. This is but one example of many diversified applications where standard Marman couplings and flanges provide the right combination of strength, light weight and positive seal, plus production and maintenance advantages of the patented "Quick Coupler Latch."

Save Cost, Time and Weight with Marman
FOR INFORMATION, WRITE DEPT. A-12

MARMAN
PRODUCTS CO., INC.
940 W. FLORENCE AVE.
INGLEWOOD, CALIFORNIA

STANDARD CLAMPS FOR SPECIAL APPLICATIONS

Power Steering

(Continued from page 54)

Torque applied to the cam, either from the steering wheel or the pitman arm shaft, exceeding the centering spring load, causes the cam to move slightly upward or downward, thus tilting the lever attached to the valve, and moving the valve spool endwise.

The Hydrapower gear utilizes a variable gear ratio of 18 to 1 in the center position, increasing to 23 to 1 at the end positions. The torque at the pitman arm shaft is 25,400 lb in. at 750 psi, the normal pressure. Maximum pressure may be increased to 1000 psi, providing a torque of 33,900 lb in. where the installation requires.

Numerous proponents of power steering, especially for passenger cars, believe that it opens the way toward an entirely new conception of what steering control, safety and ease can be. With the removal of weight restrictions from vehicle front ends, and any limitations as to tire sizes and inflation pressures, at least in so far as steering is concerned, the characteristics of the independent suspension system may be changed to vastly improve steering control. Spindle caster angles, wheel camber and cornering angles, etc., can be set to provide improved roadability and stability, while still providing greater steering ease for the driver both for on-the-road driving and when parking. They even foresee the greater employment of women drivers for the heavy-duty types of trucks and buses.

However, they admit that there is a gross lack of fundamental steering data upon which improvements and some standardization of steering characteristics can be based. Despite recent research work on steering by several car manufacturers, (7) (8) (9) (10) (11) it is believed that more is needed, before the full benefits of power steering can be achieved.

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Twice as many per dollar



Changing to Plaskon Alkyd Molding Compound enabled Barber-Colman Company to cut the cost of molding these magneto rotors for J. I. Case tractors *in half* . . . "a 50% saving." And J. I. Case credits Plaskon Alkyd for satisfactory mechanical and electrical properties, with complete absence of objectionable electrical "tracking" across the rotors.

Applications of many types, including a growing number in the automotive field, offer convincing proof that quick-curing Plaskon Alkyd can usually be molded *three to four times faster* than conventional thermosetting materials. This means that dies with fewer cavities may be used to achieve a given production rate. And because Plaskon Alkyd can be molded at lower pressures, maintenance of tools and presses is generally reduced. There are *so many ways to save* using Plaskon Alkyd for the molding of automotive electrical plastic parts! We will be glad to tell you more whenever it is convenient for you to see one of us.



Magneto of J. I. Case tractor with top removed to show operating position of rotor made of Plaskon Alkyd Molding Compound. For further information on this fast-curing plastic for high-speed compression molding, write for bulletins.

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ALKYD

AIRBRIEFS

(Continued from page 64)

unprofitable points that the scheduled airlines are forced to serve. It also held that aircoach service was simply a matter of the fare, not the particular know-how or special operating procedures of the carrier. The decision means that more and more daytime scheduled airline aircoach services will be approved at the attractive 4.5¢ per mile rate, instead of the regular 6.1¢ rate charged for first-class service. Hereto-

fore, scheduled aircoach service has been available only at very late hours (11 PM-5 AM).

Just Push a Button?

The theory behind the "standby" status of surplus World War II production plants has long been that they would be "instantly" available in the event of need. A dozen of such plants have now been reactivated and one, at least, has cost just \$28 million to do the job. Douglas Aircraft Co., assigned the task of reactivating the plant near Tulsa, Okla., where it built A-26 Invader light bombers in World War II,

found that just cleaning out surplus material and getting the building in shape was a tremendous job. Typical, too, is the fact that about \$6 million will be required for a new runway for the jet bombers (Boeing B-47) it will build, and a new electronics building is scheduled for completion in February, 1952. About 1000 machine tools have already been installed and a monster 7000-ton press is to be delivered shortly. In one year Douglas has assembled 2000 shop employees against an eventual total of 14,000 needed by the end of 1952. All-out production will require 20,000 employees.

Daffy Definitions

Somehow we picked up the rule-of-thumb that "small business" was a company employing less than 500 people but we now find that the administration uses no such simple definition. Now it appears that it all depends: there are different sizes for "small business" in different activities. For example, in the aircraft industry, a small business airframe builder is one employing less than 2500 people. If you are an aircraft equipment manufacturer, you are not "small" unless you have less than 250 employees. If it happens to be propellers you are building, you are big if you have more than 1500 employees. And if you are an aircraft engine builder, you are small business only if you have less than 2500 employees. This introduces a whole new realm of bookkeeping to decipher Air Force announcements that such-and-such percentage of procurement funds has gone to "small business." And these criteria will change as the industry grows.

U. S. Lifts the World

Latest Civil Aeronautics Board statistical study shows that 80 per cent of the world's transport aircraft were built in the United States, 56 per cent of them by Douglas Aircraft Co. alone. The world's airlines are now operating 3330 transports of all types, a gain of 55 transports over last year. The U. S. itself is operating 1218 of these, or roughly one-third. However, the U. S. is operating over one-half of the total number of four-engined transports in service on the 217 scheduled airlines of the world.

Engineer Shortage Aids

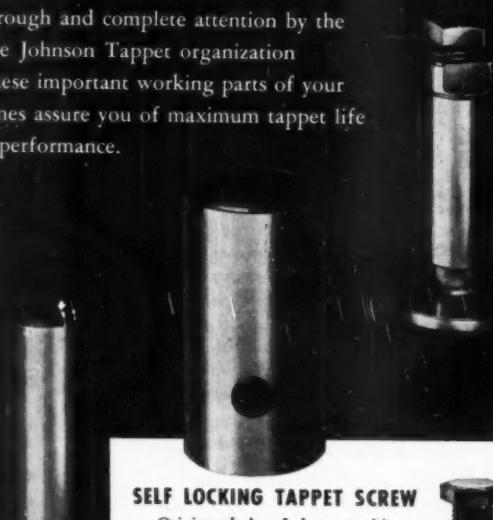
The shortage of engineering personnel is probably one of the most publicized problems of the aircraft industry but on the theory of the cure fits the disease it must be bordering on the desperate. Boeing Airplane Co., for example, is offering to train interested shop personnel as draftsmen in a full-time five-week course. Following completion, the graduate enters the engineering department. Boeing believes that the non-technical trainee can learn

(Turn to page 122, please)

JOHNSON Tappets

are made by Tappet Specialists

Thorough and complete attention by the entire Johnson Tappet organization to these important working parts of your engines assure you of maximum tappet life and performance.



SELF LOCKING TAPPET SCREW

Originated by Johnson this diaphragm type Self Locking Tappet Screw is operating successfully in millions of cast iron and steel tappets.

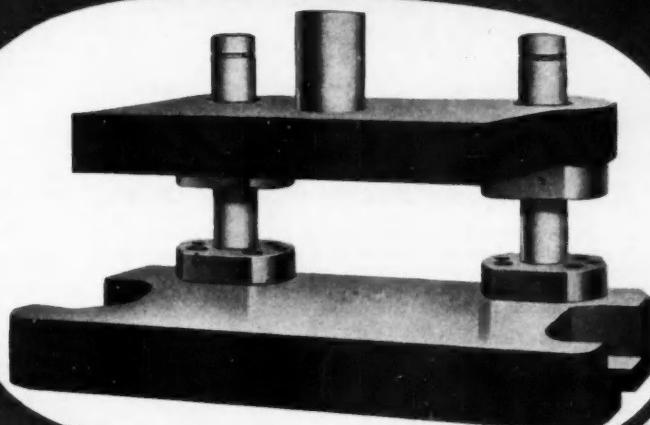


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Thank You... Men of the Industry

For your continued use of Baumbach's precision die sets.

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AIRBRIEFS

(Continued from page 120)



"Using the Right Cutting Fluid Would Eliminate a Lot of Time and Money Wasted Changing Cutters"

There are literally thousands of examples to prove how the right application of the *right* cutting fluid can make a tremendous difference in machining efficiency. Here is another one which will help you realize the opportunities afforded by an open-minded look at your cutting fluids:

- **THE JOB:** Generator machining a 1" dia. worm gear, double thread.

COMPARISON OF CUTTING FLUID PERFORMANCE

	Previous Oil	Stuart's THREDKUT
Production per grind/dress	20 pieces average	190 pieces average
Finish	Possible	Satisfactory
Oil dilution	None	4 to 1
Cost of oil on machine	42c/gal.	27.2c/gal.
Downtime during test	2½ hours	None

Think of the increase in cutter life (cost about \$86.90 each). Before using Stuart's ThredKut they were reground 9½ times as often. Add to this the saving in downtime and the saving in cutting fluid price and you'll see why "Rudolph is Right."

Write for your copy of Stuart's Shop Notebook—a bi-monthly publication devoted to the selection and application of metal-working lubricants.

GET MORE PRODUCTION
Use The Right Cutting Fluid

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STUART SERVICE
Goes with every Barrel

Offices in Principal Industrial Centers

drafting well enough in five weeks to assist engineers in the preparation of drawings, leaving the latter free for design work.

Convair is importing Canadian engineers for design work, assuredly a measure of sheer necessity. This is no criticism of Canadian engineers but the seriousness of the situation lies in the fact that only U. S. citizens can be accepted for security approval on Government projects and this means that Convair will house the Canadians in a separate building and engage them **only on commercial projects**. While this sounds simple on the surface of it, most aircraft engineering departments use the group system in which the landing gear group, for example, handles this assembly on every airplane, regardless of type. Since the Canadians cannot be assigned to regular groups, Convair will have to go over to the so-called project system, leading to considerable duplication of effort. But this, apparently, is a necessity—so short is engineering personnel.

Machine Tool Shortage?

A footnote to the serious shortage of machine tools is the fact that the Air Force still has 5000 and the Navy 1000 assorted machine tools available to defense contractors on a rental basis with few takers in sight. Major complaint of applicants is the difficulty in getting all Government agencies involved to okay a selection. Air Force, Bureau of Aeronautics, joint Army-Navy, Defense Production Administration and a "Joint Central Inventory Group" must all approve the removal of a piece of equipment and the leasing arrangement must be approved through Washington. Plant representatives apparently can see 'em and touch 'em—but not take 'em!

American Air Filter Sets Up Sales Branch in Canada

The American Air Filter Co., Inc., has announced that, after Jan. 1, 1952, its Canadian business will be handled by American Air Filter of Canada, Ltd., with offices in Montreal and Quebec. Representatives will be stationed in leading Canadian cities to handle the firm's line of air filters, electronic precipitators, and dust collectors.

North American Adds More Floor Space

North American Aviation Corp. has announced expansion into seven new buildings and hangars in the Los Angeles, Calif., area. The new facilities will provide 483,000 sq ft of additional manufacturing floor space.

Another Thompson "First"...

T.P.M.

makes the big difference
in valve life

ORDINARY VALVE



T.P.M. VALVE



These two Thompson valves from Pratt and Whitney Aircraft R-4360 Engines were photographed after first overhaul.

T.P.M. is the new valve material developed by Thompson to give greater corrosion resistance and higher strength at valve operating temperatures. T.P.M. is a result of Thompson's vast experience in valve development and knowledge of the behavior of metals at high temperatures.

Other Thompson "firsts" include a new coating alloy for valve heads and faces, and stem-peening to provide harder, more wear-resistant stem surfaces.



VALVE DIVISION

Thompson Products, Inc.

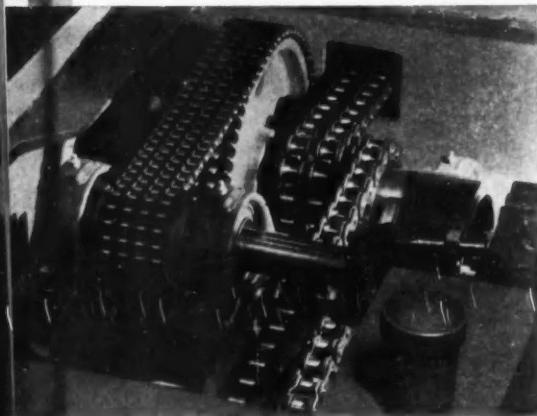
EUCLID, OHIO

YOU CAN COUNT ON THOMPSON
FOR ENGINEERING LEADERSHIP

ONE sure, low-cost answer



SECRET of the Trackmobile's pulling power is an in-built hydraulic jack. After car is coupled, the hydraulic jack raises the coupler sufficiently to transfer part of the car's weight to the Trackmobile, thus giving the Trackmobile enormous tractive effort. Precision-engineered and precision-built Morse Roller Chains then deliver the tremendous power to move the heavily loaded Trackmobile with ease.

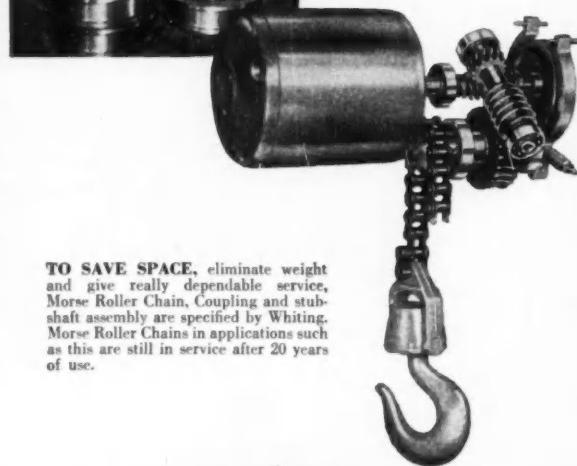


QUADRUPLE-, double-, and single-strand Morse Roller Chain in Trackmobile's main drive assure positive, no-slip power. Dependable Morse Roller Chains operate equally well on long or short centers . . . absorb great shock and strain. Chain prelubricated and packaged to specifications.

transmission



SMALL BUT POWERFUL Whiting Electric Hoist uses Morse Roller Chain over extra-large Morse Sprocket for maximum strength, minimum wear. Chain won't stretch, bind, twist . . . assures longest service life.



TO SAVE SPACE, eliminate weight and give really dependable service, Morse Roller Chain, Coupling and stub-shaft assembly are specified by Whiting. Morse Roller Chains in applications such as this are still in service after 20 years of use.

Ask the Morse Man for power transmission information!

100 Morse
Branch Offices
and Distributors
to supply your
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sion demands.

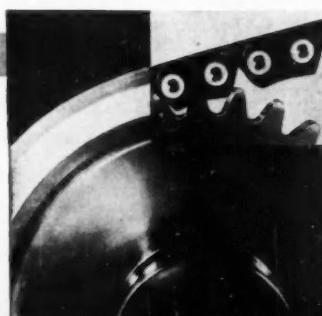


From coast to coast there are more than 100 offices, representatives and distributors of Morse Power Transmission products to give you quick information and service when you want it—where you want it. Ask the Morse Man first in any case! Check your classified phone directory under "Power Transmission" or "Chains" for the nearest Morse Man.

Morse



Drive



to TWO tough power problems . . . MORSE!

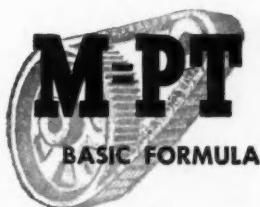
When ordinary power transmissions couldn't fill the high-power requirements of the Whiting Trackmobile, Whiting turned to Morse.

They got the answer, quick! Morse Roller Chains and Sprockets, a Morflex Coupling and Roller Chain Couplings now transmit more than enough power for the Trackmobile to spot, switch and haul fully loaded railway cars with ease . . . at less operational cost, too!

Morse answered another Whiting demand, too, by furnishing roller chain and sprocket stub-shaft assembly, small and sufficiently light in weight to fit the compact, exacting design of the Whiting Electric Hoist . . . yet sturdy enough to lift heavy shop materials.

Two more tough power transmission problems whipped by Morse!

If you have a tough problem in power transmission, get in touch with Morse. Morse has a complete line of superior roller and silent chain drives, couplings and clutches, including the sensational new HY-VO Drive. And Morse engineers are unusually expert at helping you utilize them for more efficient, trouble-free power transmission at a savings.



Morse means
Power
Transmission

◀ Revolutionary Morse HY-VO Drive transmits more horsepower at higher speeds than any other type of drive

A single HY-VO Drive will transmit up to 5000 H.P., with up to one-third longer service life. New design principles practically eliminate pounding, bouncing, jerking, vibration. HY-VO opens way to transmit more horsepower from smaller, less costly high-speed engines. We welcome your request for more information (at present time, though, orders must carry priority rating).

MORSE
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PRODUCTS

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Observations

By Joseph Geschelin

Hydraulic Tappets

With the introduction of some new engines for '52, competition among pro-

ducers of hydraulic valve lifters has become more intensified. At the present writing, the Diesel Equipment Div., General Motors Corp., is supplying GM divisions. Eaton Zero-Lash hydraulic

valve lifters—the oldest in volume production experience—are used by producers outside of GM. And now Johnson Products has been adopted as standard equipment on a new V-8. In addition to these, Chicago Screw Co. has been grooming an interesting tappet which has been undergoing testing for some time.

Full Filter

Ford Motor Co. has conducted some laboratory and field tests indicating that factory-installed full flow filters have an important bearing on engine life. So much so that full flow filters will be mounted on new engines. If car owners will change filter cartridges as instructed, Ford expects still better service experience and less trouble from cylinder bore and piston ring wear.

Plastic Weathers

It seems superfluous to say that plastics intended for exterior application must be capable of weathering. Certainly plastics producers have formulations designed for this purpose. The fact remains, however, that even in recent years some exterior plastics parts have exhibited severe weathering to the detriment of appearance. Has purchasing overruled engineering specifications in this instance?

Valve Rotators

Several new passenger car engines for '52 will have valve rotators on both intake and exhaust valves, while Willys has settled for exhaust valve rotators. Designers claim this is the only way to extend valve life with present fuels.

Turbine Engines

Recent entry of Continental with a line of gas turbines and jet engines for commercial aircraft applications, revives the question whether the gas turbine is a logical successor to the piston engine for certain heavy road vehicles. Boeing and Kenworth have teamed up to prove that the gas turbine can do the job insofar as the mechanical installation is concerned. There still remains the problem of fuel mileage. Continental claims higher fuel economy than competitive machines. Perhaps further development, on a wider scale, may bring gas turbine fuel mileage within a more practical range than exists today.

Styling Trends

When the returns are in on '52 models, there will be a number of

Expertly machined HARDENED & GROUNDED PARTS

THE sleeve shown here is a large piece and represents an exacting job—the kind we handle well. It calls for accurately hobbed threads over the full length . . . a polish-ground bore concentric with the pitch diameter of the threads . . . tolerances that challenge our ingenuity and skill.

Brown Hardened and Ground Parts have served the automotive industry for more than 40 years. In that time we've gained invaluable experience in precision machining, scientifically-controlled heat treating and micro-finish grinding. These capable facilities are at your command. Merely send us your prints; write or wire your requirements.

Henry W. Brown
PRESIDENT

Experienced production on
King Pins • Shockie Bolts • Shockie Pins
Brake Anchor Bolts • Countershafts
Idler Shafts • Stub Axle Shafts
Steering Ball Bolts
Beam Bolts and Bolts •
5th Wheel Rocker Shafts • Wheel Studs
Water Pump Shafts
. . . anything in the hardened and ground
line, of any analysis steel, up to 4½"

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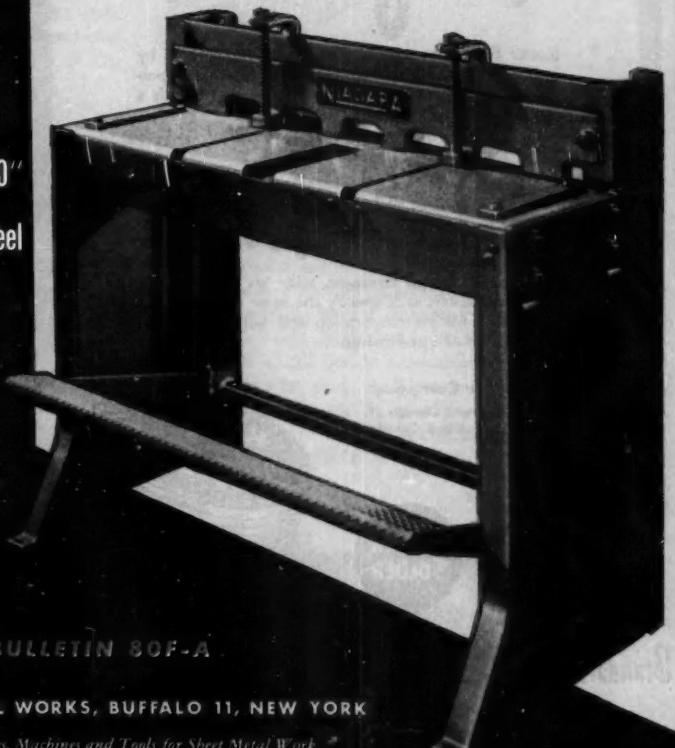


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to Operate*

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- ★ Holdown on sizes 36" and larger
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- ★ Easy Operation...Lively Action...
- ★ Portable
- ★ Complete Set of Gages
- ★ Cutting Lengths from 22" to 120"
- ★ Capacity 16 and 18 Gage Mild Steel

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ASK FOR BULLETIN 80F-A

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America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK

Kester Solder



Delicate fabrication or massive work, Kester makes a specialized flux-core solder (over 100,000 different types and sizes) that will do the job perfectly. Kester Solders are made only from the finest grades of tin and lead commercially available.

Preferred

Kester Flux-Core Solders are not only preferred by industry, but individual workers also insist upon Kester to enable them to do their best work with a minimum of rejects.

Saves Time

A Kester Technical Engineer, with his wide experience in industry, will specify the most efficient flux-core solder for your operation and will suggest the best method of application.

Kester Solder Company

4201 Wrightwood Ave., Chicago 39
Newark, N. J. Brantford, Canada

Send for free manual
"SOLDER and Soldering
Technique"

KESTER
SOLDER



Standard for Industry since 1899

entirely new bodies produced by car companies who started considerably ahead of present restrictive conditions. This new swing, according to our own judgment, will effect more similarity of appearance than we have witnessed for some years. One-piece windshields will be the rule rather than the exception. And tinted glass will be available on most makes. Curiously enough, the so-called "fish-tail" fender treatment on the Cadillac which seemed so unusual a few years ago has affected the design of most new models in one way or another.

Drawing Quality

At a recent meeting of Detroit Section SAE, a prominent steel mill metallurgist warned that under present operating conditions the drawing quality and surface finish of sheet steel may suffer rather than improve. This is due in part to the serious scrap shortage and with it the need for using whatever scrap is available. Under these conditions it will be difficult if not impossible to hold chemistry to present specifications. The speaker recommended two courses of action: first, to inspect all sheet steel in advance of blanking and divert off-standard sheet to jobs requiring less depth of draw; and second, to resort to polishing of sheets, using the familiar Murray-Way and Hill-Acme equipment to correct surface imperfections. In short, anything at all to prevent rejection.

Easier Steering

With power steering coming into its own this season, it is of interest that a new type of front end suspension will be introduced that takes the work out of steering. In fact, it was found necessary to add friction to provide stability. Here then is another answer to the same problem.

Last Word

For building its V-8 engine De Soto has unveiled the most advanced plant we have seen to date. Equipment and methods bristle with "firsts." Among other features, it boasts automatic chip disposal, a centralized cutting fluids system, and some of the most advanced quality control instruments known to the art. It takes the combination of all these features to enable a manufacturer to produce engines at reasonable cost.

Alternate Materials

Faced with the problem of dwindling materials supply, most producers are seeking alternate materials. It is not a new situation; it is simply intensified. (Turn to page 132, please)

**The Proof of a Bearing
is in its Performance!**

DUREX-100 ENGINE BEARINGS

Yes, performance in use is the test of any product. And it is a test passed with flying colors by Durex-100 engine bearings used as original equipment on Cadillac, Buick, Oldsmobile, G.M.C., and other leading makes of cars and trucks.

The test of performance shows a dramatic difference between Durex-100 engine bearings and conventional type bearings—a difference that shows up in greater endurance and longer life.

What makes the difference? One of the features is the matrix of the bearing. For the exclusive matrix of Durex-100 makes possible greater embedability—actually provides a haven for particles of foreign matter that in other bearings could cause serious damage. Yes, greater embedability is the

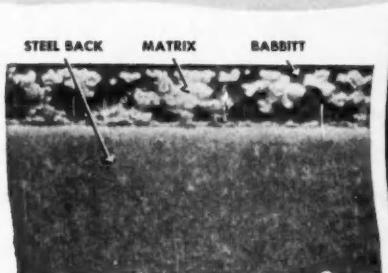
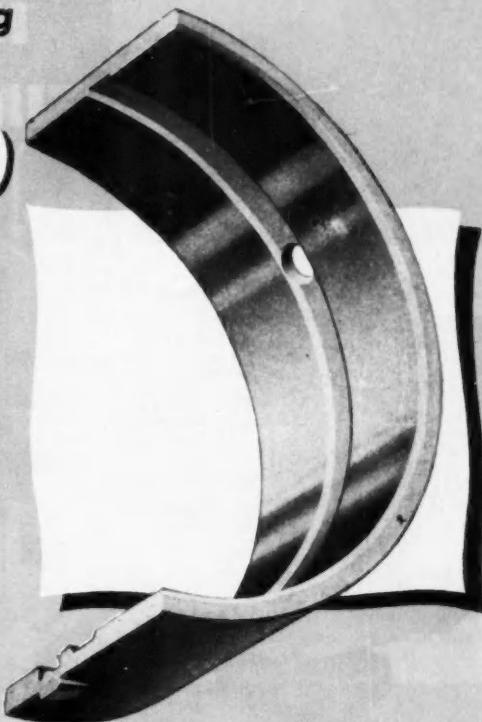


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING.
MAGNIFIED 30 TIMES

THE MATRIX MAKES THE DIFFERENCE
Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically, with thin high-lead babbitt overlay.

secret—for the embedability of Durex-100 is not limited to the thickness of the babbitt overlay. It is provided by the babbitt overlay PLUS the full depth of the matrix!

Durex-100 engine bearings are made with a steel back covered by a layer of metal powders that, by a sintering process, form the porous matrix—integrally brazed to the steel back. High-lead babbitt penetrates the matrix and bonds mechanically and metallurgically with it. This is the Durex-100 engine bearing feature that, among other things, assures greater embedability, greater protection from damage.

MORAINÉ PRODUCTS
DIVISION OF
GENERAL MOTORS
DAYTON, OHIO

*Durex-100
Engine Bearings
by Moraine*

HOW TO CUT TIME FOR SMALL LOT MILLING



Standard Rigidmil equipped with magnetic fixture. Note variety of work handled.

Standard Rigidmil With Sundstrand Magnetic Fixture Averages 50% Savings On Lot Sizes of 1 to 25 Pieces

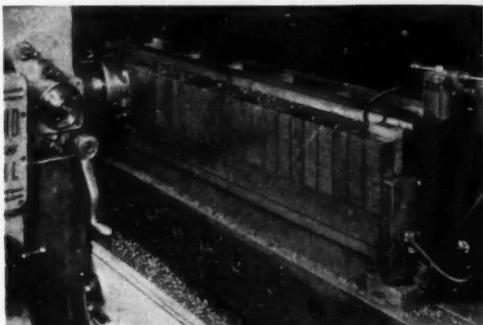
If you want to cut costs and increase production on miscellaneous milling, investigate this excellent combination. It consists of a Sundstrand Standard Rigidmil equipped with a Sundstrand magnetic fixture. Parts machined in this installation include tool blocks, cam bars, tool slides, motor brackets, etc. Lot sizes vary from 1 to 25 pieces, and time

reduction averages 50% over former method. In addition to saving time through the elimination of mechanical clamps, these magnetic fixtures save the cost of special jigs or fixtures. Install a combination like this and you'll be surprised at the number of different parts you'll be able to mill faster and better. Call in a Sundstrand methods engineer. He'll be glad to help you.

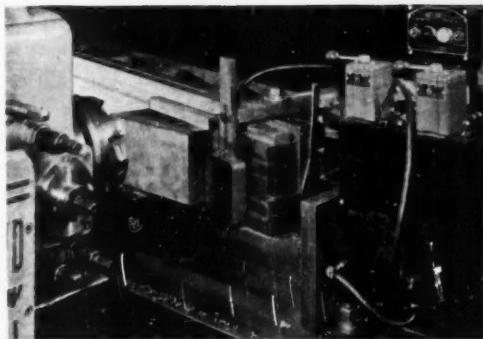


RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

5 TYPICAL SET-UPS



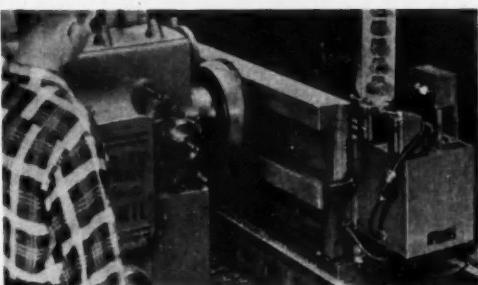
Twenty-five pieces of cold rolled steel are held in the fixture for this milling operation. Feed rate is 17" per minute and depth of cut is 1/8".



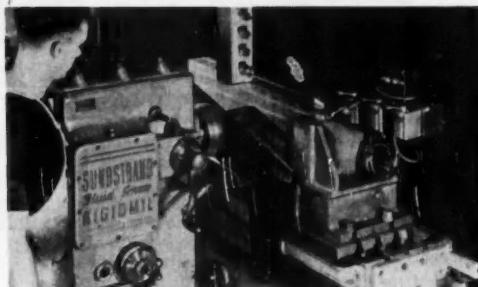
Holding steel tool block for milling angular top face. An 8" dia. carbide tipped cutter takes a 1/4" deep cut at 14" per minute feed rate.



Milling 1/2" wide by 1/4" deep slot in steel tool block at 4" per minute feed rate.



A 12" carbide tipped cutter is used to mill this cast iron part at 8" per minute feed. Depth of this interrupted cut is 3/16".



This cast iron part is milled on all sides. The feed rate is 10" per minute and depth of cut is 3/16".

Get This FREE Additional Data

For complete information on standard Sundstrand Rigidmils, write for bulletin No. 214. For more information on Sundstrand Magnetic Fixtures, ask for bulletin No. M214.



SUNDSTRAND
Machine Tool Company

2571 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES

(Continued from page 128)

fied by circumstances. For example, some zinc die castings have been replaced by sheet metal assemblies. Plastics and glass are being considered more seriously. At the National Metals Show in Detroit and more recently at the Chrysler Engineering display, it was noted that magnesium die castings were being employed quite generously in the replacement of zinc die castings. Incidentally, we understand that in certain instances magnesium replaces zinc strictly on a cost basis.

Cold Extrusion

While cold extrusion is by no means a new art, it is evident that great strides have been made recently in the development of techniques and dies designed to extend the range of applications. An anomaly in the situation is that although it would be of unquestioned advantage to the gathering defense program to spread news of current developments, it appears difficult to break loose information on current applications intended for war materiel.

The question is how can we inform those who should know about new developments unless an exchange of information is permitted.

Pivoted Pedals

One of the interesting features introduced for '52 is the adaptation of the Bendix Treadle-Vac power brake on passenger cars. First new application recorded in AUTOMOTIVE INDUSTRIES was on Packards. With this arrangement, the master cylinder is attached to the dash within reach of a pivoted pedal. At least three other makes will have pivoted brake and clutch pedals in conjunction with conventional brakes and manual shift transmissions. The hinged or pivoted pedals require less effort and are a real aid to driver comfort.

Saving Copper

Conservation of copper is one of the major topics today. It has been pointed out that the reduction in car production alone is responsible for a large percentage saving. In addition, a number of car producers have succeeded in reducing the size of the radiator core for 1952. As more experience is gained with the use of aluminum for ignition cable and for battery cable, still further gains can be made.

**COSMOLINE COATED GUN
COMPLETELY DEGREASED
IN LESS THAN 4 MINUTES**

Four 20 mm. guns heavily coated with Cosmoline are lowered into the degreaser.

BEFORE

AFTER

Guns are raised from the degreaser in a clean, dry condition, ready for subsequent operations.

WITH A PHILLIPS Electric VAPOR DEGREASER

Here was a really tough metal cleaning problem. Cline Electric Mfg. Company, Chicago, had to remove Cosmoline from a large quantity of 20 mm. guns before going ahead with modification operations on the guns. Estimating that other cleaning methods would take about 2 hours per gun, Cline purchased a Phillips electric batch-type degreaser to handle the job. As a result sixteen guns are being degreased per hour at a savings of 85% on cleaning costs per gun. Cline reports that the degreasing operation thoroughly prepares each gun for subsequent operations.

Here is another instance of how Phillips degreasers cut manufacturing costs through faster, more thorough, more economical metal cleaning. If you have a degreasing problem, check with Phillips. Our engineers will be glad to recommend the right machine for your job from Phillips' complete line of standard degreasers.



Phillips

3465 Touhy Avenue • Chicago 45, Illinois
MANUFACTURING COMPANY
ENGINEERED METAL CLEANING EQUIPMENT

Concave Roller Conveyor

Designed for handling all types of cylindrical objects, the Alvey-Ferguson Co., Cincinnati, Ohio, has put out a concave roller conveyor. The A-F conveyor keeps the cylindrical objects in the center of the conveyor line and prevents them from slipping to either side or sliding off the conveyor line.

Made of No. 10 gauge steel tubing, the concave roller is available with a 7/16 in. shaft for ordinary work or a 11/16 in. shaft for heavy duty work. Either size shaft can be furnished with plain, dust-tight or grease-seal ball bearings. A-F concave rollers can be furnished with rubber coverings. Both straight and curved sections available.

AUTOMOTIVE INDUSTRIES . . .

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Automotive and Aviation

MANUFACTURING



The Crankshaft

—probably the most important single part in the modern high-speed, high-compression, internal-combustion engine.

Wyman-Gordon—specialists in the design and forging of crankshafts since the start of the automotive industry—furnished the first heat-treated crankshaft, forged the first six-throw crankshaft, forged the first eight-throw crankshaft, forged the first crankshaft with integral counterweights. In automotive crankshafts and in all types of aircraft forgings, steel and light alloy, there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL
WORCESTER, MASSACHUSETTS
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You name it...

Binks will show you how
to spray paint it...

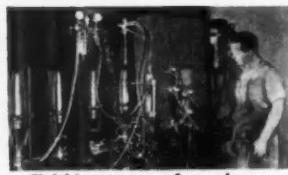
faster... better... more economically



Automotive finishing systems



Conveyerized spray systems



Finishing systems for ordnance



Aircraft finishing systems

Whatever the product, chances are 100 to 1 that Binks can help you find a spray painting method that increases production, reduces rejects and lowers costs. Here's why:

During the last half-century, Binks has developed equipment to spray paint almost every product made... in war and peace. Thousands of manufacturers have capitalized on this wealth of experience. It costs you nothing to have Binks check your present methods... and you stand to gain in many ways.

SEND NOW for Bulletin 10. It lists hundreds of products painted by modern spraying processes and illustrates many unusual and outstanding installations. Tells how you can get better finishes—faster—and at lower costs. Bulletin 10 is especially valuable for those interested in defense production. No obligation.

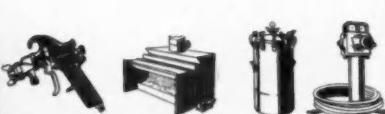
Binks Manufacturing Company, 3120-30 Carroll Ave., West, Chicago 12, Illinois.



Binks

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Steel Quality and Body Design

(Continued from page 116)

sheet are done at several different sources. In this way, when the sheet is defective, it is very difficult to say where responsibility lies.

Another complaint is the lack of availability of wide sheets, those over 72 in. and the extra cost of such sheets. This condition forces the working out jobs with more joint lines. These extra joint lines usually cannot all be styled into the job and, therefore, mar its appearance or, if soldered and finished, cause excess cost.

In his presentation, Mr. Cutler reviewed the advancement in rolling mill practice over the last 30 years, touched on the advent of modern facilities for hot and cold rolling, and emphasized the quality control impressed on every phase of steel mill practice.

Among the major elements subject to scientific control are: gage thickness, grain size, chemistry, drawing quality, and finish. For example, gage thickness is checked continuously by means of X-ray inspection equipment. Surface finish, naturally, is of paramount importance to the user. And Mr. Cutler suggested that under pressure of short supply, it may be desirable to correct surface imperfection by means of the automatic polishing equipment which has been used by automotive producers since the end of the war.

In view of mounting problems of control under present-day operations, Mr. Cutler recommended close inspection of sheets and strip and coiled stock before performing any of the press operations. If drawing quality is not suitable for specific deep drawing applications, he suggests shifting the rejected sheets to jobs subject to simpler draws, rather than returning the material to the mill.

Mr. Cutler did not hold out much hope for improvement either in surface finish or in drawing quality because of the tight scrap situation and the dependence upon available scrap regardless of its quality.

Motor Vehicle Taxes Exceed \$1.6 Billion

The National Highway Users Conference reports that highway users contributed \$1.62 billion in federal excise taxes in the fiscal year ended last June 30. It breaks down the taxes into the following categories: gasoline, \$525,720,649; lubricating oil, \$44,685,767; automobiles and motorcycles, \$625,520,612; trucks, buses and trailers, \$177,183,035; tires and tubes, \$177,509,356; and parts and accessories, \$104,231,206.



Perhaps we can
give YOU a
**HELPING
HAND**

• Under present conditions we cannot always give you all the materials you require. But we can give you plenty of help through Revere's Technical Advisory Service. And, our colleagues in American business tell us it's a worthwhile aid, too. We have been rendering this service for many years, and it is backed by a wealth of knowledge accumulated over a century and a half of working with metals.

So, with your problems on the increase, as whose aren't these days, why not check us on what's bothering you and see if we can't help. We are already helping others regarding the usage, to their best advantage, of the products they *can* get.

Since two or more heads can produce more right answers than one, let's get together. You can get in touch with the Revere Technical Advisory Service through the Revere office nearest you.

REVERE *150th YEAR OF SERVICE TO AMERICA*
COPPER AND BRASS INCORPORATED
Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Roma, N. Y.—
Sales Offices in Principal Cities; Distributors Everywhere

SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

Defense Contract Awards

This latest list of defense prime contracts that have been awarded covers the period from Oct. 25 to Nov. 23. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

Unit quantities and dollar amounts

are given for contracts from \$25,000 to \$250,000. Contracts above \$250,000 are indicated by "over \$250,000," but their actual dollar amounts and unit quantities are not available. In some instances the quantity and the dollar value have not been released by the Department of Commerce and this is indicated by the letters "N.F." (not furnished) in this list.

— A —

Adeco Products, Inc., Chicago, Ill.
Repair parts—1448—\$35,400

Aeronca Mfg. Co., Middletown, Ohio
Facilities—over \$250,000

Aeroprodcts Div., General Motors Corp., Dayton, Ohio
Assemblies—\$50,000
Materials and services—\$90,743

Aeroquip Corp., Jackson, Mich.
Hose—46185 ft—\$29,558

Aircooled Motors, Inc., Syracuse, N. Y.
Equipment—\$200,000

Aircraft Tapered Sheets, Inc., Los Angeles, Calif.
Facilities—\$58,000

Airesearch Mfg. Co., The Garrett Corp., Los Angeles, Calif.
Services & material—var. ea.—\$100,000

Allen Industries, Inc., Detroit, Mich.
Vehicle parts—over \$250,000

Allison Div., General Motors Corp., Indianapolis, Ind.
Services & material—over \$250,000
Spare parts—over \$250,000
Production facilities—over \$250,000
Parts for J-33—\$60,000
Transmission—8—\$100,000

American Bosch Corp., Springfield, Mass.
Spare parts—\$4,266

American Car & Foundry Co., New York, N. Y.
Facilities—over \$250,000

Anderson Co., Gary, Ind.
Vehicle parts—1660 ea.—\$25,414

Arco Mfg. & Sales Corp., New York, N. Y.
Repair parts—6500—\$42,000

The Auto Engine Wks., Inc., St. Paul, Minn.
Repair parts—15395—\$128,424

Avco Mfg. Corp., Crosley Div., Cincinnati, Ohio
Facilities for B-47—over \$250,000

— B —

Baldwin-Lima-Hamilton Corp., Eddystone, Phila., Pa.
Repair parts—3090—\$51,511

Beech Aircraft Corp., Wichita, Kansas
Misc. spares—\$33,849
Spare parts—\$100,000

Bell Aircraft Corp., Buffalo, N. Y.
Services & material—var. ea.—\$50,000

Bendix Aviation Corp., Eclipse-Machine Div., Elmira, N. Y.
Equipment—\$220,000

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.
Maintenance parts—var. ea.—\$53,426

Carburetors—\$48,772
Misc. parts—\$100,000

Fuel injection systems—over \$250,000
Wheel and brake assys.—over \$250,000

Service and material—var. ea.—\$100,000

(Turn to page 138, please)

Mile for Mile Donaldson **HEAVY-DUTY** Mufflers cost you less!



Model M01201 Oval-Type for Under-chassis installations. Dimensions: 10" x 15" oval, 25" body length, 4 1/2" I.D. sleeves.

DONALDSON COMPANY

Receiving-Inspection Tag

MODEL: M90016 Muffler

REMARKS: Removed for inspection at 103,000 miles

CONDITION: Cut-away reveals internal and external parts in good condition.

Over 103,000 miles and still in good shape! That's what engineers found when they removed this Donaldson Muffler from a 300 HP Diesel truck engine, picked at random on a West Coast Highway. Examined in the Donaldson laboratory, the muffler was found to be sound and free from structural weaknesses.

Fully-engineered, made of corrosion-resistant aluminized steel . . . Donaldson Heavy-Duty Mufflers combine long life with exceptional noise reduction and extremely low back pressure.

Fleet operators should contact local truck dealers. Manufacturers are invited to write direct.

Dimensions: Model M90016 vertical cab-mount muffler: Diameter 9", body length 45", I.D. sleeves 4 1/2".

DONALDSON COMPANY, INC.
664 Pelham Blvd., St. Paul 4, Minn.

Donaldson Mufflers

3 WAYS DY-NAMIC BALANCING can Help YOU with Today's Defense Production Problems!

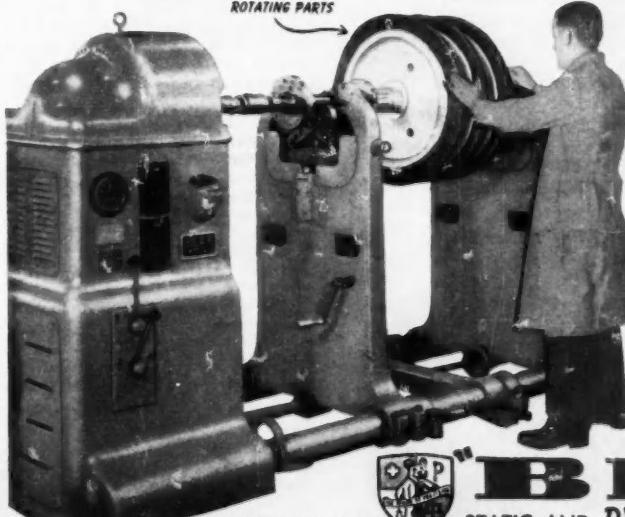
"BEAR" DY-NAMIC BALANCING MACHINES
CUT COSTS . REDUCE WEAR !

- 1** meet certain government specifications
- 2** lick vibration waste
- 3** improve product performance

FROM SMALL
MOTOR
ARMATURES . . .



TO LARGE
ROTATING PARTS



One of the most costly wastes in industry is Dy-Namically un-balanced rotating parts. Static balancing, alone, without Dy-Namic Balancing, is not enough—often causes more harm than good. The couple-force vibrations resulting from Dy-Namic un-balance cause premature wear, increased maintenance costs and reduced efficiency. The perfect solution to these problems is the "Bear" Dy-Namic Balancer which balances rotating parts both statically and Dy-Namically in one operation.

Today the waste caused by Dy-Namic un-balance is more costly than ever in lost production and man hours. That's why so many hundreds of manufacturers have adopted "Bear" Dy-Namic Balancing as an essential

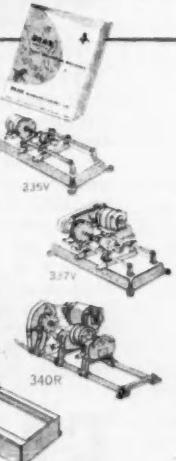
part of their regular production and maintenance procedures. Whether it is to meet government specifications or to improve product performance and life, these plants have found in the new "Bear" Dy-Namic Balancing Machines the solution to the problem of quicker, lower-cost balancing. On the production line, accurate Dy-Namic Balancing can help make sure of longer service, greater efficiency and fewer maintenance problems. In your maintenance shop you eliminate repair time by keeping your own equipment in balance.

NO MANPOWER PROBLEM

"Bear's" new and simple principle of operation eliminates the need for complicated mechanism. The result—you get a faster, easier-to-operate machine. There is no need for skilled technicians... almost any man or woman can be quickly trained as an operator.

INVESTIGATE TODAY! GET FREE MANUAL WITH UP-TO-DATE FACTS
The 24-page "Bear" Dy-Namic Balancing Manual contains engineering data, case studies, Dy-Namic Balancing tables and application-illustrations to help you gather the FACT'S on how you can save money and time by Dy-Namically Balancing every rotating part in your plant and shop! Write for your free copy.

BEAR MANUFACTURING CO., DEPT. A-21, Rock Island, Ill.



... IF IT ROTATES IT NEEDS DY-NAMIC BALANCING

Whatever the rotating part—from tiny armatures to members weighing thousands of pounds—there is a "Bear" Machine for the job. These machines are available in several standard models, types and sizes or in special models to meet your specific requirements.



B E A R

STATIC AND DY-NAMIC BALANCING MACHINES

BEAR Trade Mark Reg. U. S. Pat. Off.



Gearmaking AT ITS FINEST!

HERE "under one roof" at FAIRFIELD is everything needed for producing fine gears — metallurgical department, batteries of the most modern machines, testing laboratories, complete heat-treating facilities — all operated by skilled craftsmen working under expert engineering supervision. By specializing exclusively in "FINE GEARS MADE TO ORDER" for more than thirty years, FAIRFIELD has become one of America's largest producers of these parts. This is why many makers of construction machinery . . . agricultural implements . . . machine tools . . . military equipment . . . tractors, trucks, and buses now regularly depend on FAIRFIELD to meet their requirements. *For the Best in Gears, Specify Fairfield!* FAIRFIELD MANUFACTURING CO., 319 So. Earl Ave., Lafayette, Indiana.



Contract Awards

(Continued from page 136)

Shock strut—over \$250,000
Carburetors—\$62,630
Shock strut—107 ea.—\$38,877

Biederman Motors Corp., Cincinnati, Ohio
Vehicle parts—625 ea.—\$41,034

Boeing Airplane Co., Seattle, Wash.
Facilities—over \$250,000

Boeing Airplane Co., Wichita Div., Wichita, Kansas
Repair—\$50,000

Bowen & McLaughlin, Phoenix, Arizona
Engines—over \$250,000

Brooks & Perkins, Inc., Detroit, Mich.
Facilities—over \$250,000

The Buda Co., Harvey, Ill.
Spare parts—var—\$41,250
Repair parts—335—\$66,172
Spare parts—\$31,100

— C —

Cadillac Motor Car Div., General Motors Corp., Detroit, Mich.
565 guns, 40 mm, self propelled—over \$250,000

I. I. Case Co., Racine, Wis.
Spare parts—var—\$26,000
Spare parts—\$31,125

Caterpillar Tractor Co., Peoria, Ill.
Spare parts—250 itm.—\$44,000
Spare parts—var—\$128,500
Spare parts—var—over \$250,000
Spare parts—var—\$53,750
Spare parts—var—\$184,625
Tractor—over \$250,000
Spare parts—over \$250,000
Spare parts—over \$250,010
Spare parts—\$79,000
Spare parts—\$78,750
Spare parts—\$99,750

Cessna Aircraft Co., Wichita, Kansas
Facilities—over \$250,000

Chandler-Evans Div., Niles-Bement-Pond Co., West Hartford, Conn.
Carburetor—\$25,000

Chase Aircraft Co., Inc., West Trenton, N. J.
Facilities—over \$250,000

Chrysler Corp., Detroit, Mich.
Block assembly—440—\$30,324

Cleveland Aero Products, Inc., Cleveland, Ohio
Maintenance parts—var. ea.—\$30,196

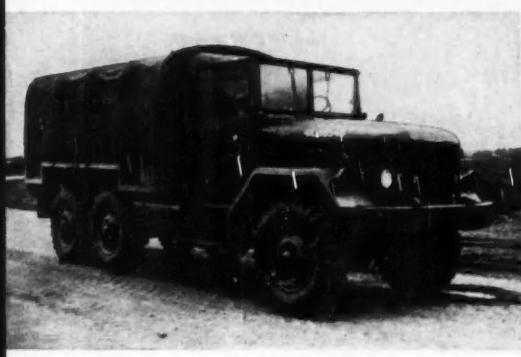
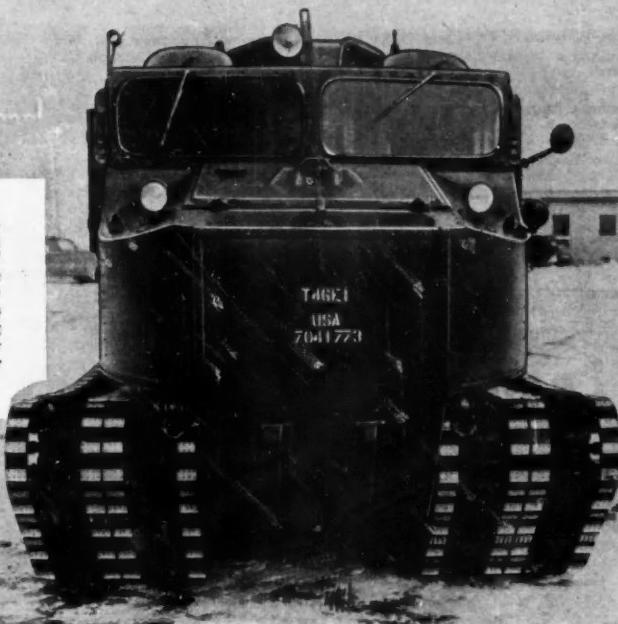
Clifford Mig. Co., Standard Thomson Corp., Waltham, Mass.
Cooler assy—135 ea.—\$25,670
oil, round, aluminum

Consolidated Vultee Aircraft Corp., Ft. Worth, Texas
Fire control system—over \$250,000
Equipment—over \$250,000
Design—\$192,000
Repair—\$50,000

Consolidated Vultee Aircraft Corp., San Diego, Calif.
Repair—\$25,000

Continental Aviation & Engineering, Detroit, Mich.
Marboro II engines—10 ea.—\$190,442
(Turn to page 140, please)

NEW ARMY "OTTER" Newest, most versatile of Army amphibious vehicles. Scheduled for production by the Pontiac Division of General Motors, the "Otter," boasts the Army, can turn on a dime, swim, plow through mud and travel on dry land at speeds up to 36 miles an hour. Its efficient heating system relies on the South Wind "978" . . . for heating personnel and preheating the power plant.



NEW REO "EAGER BEAVER" Army's newest six-by-six . . . 2½ ton heavy duty utility vehicle and cargo carrier. Can travel up 60% grades or under water. A South Wind "978" defrosts windshield, keeps cab and personnel warm.

GENERAL PERSHING The Army's World War II medium tank—the M26. Personnel of this mighty, armored Goliath are kept comfortably warm, thanks to a South Wind "978" heater.



"MOBILITY RETAINED IN WINTER" WITH NEW MILITARY HEATER

**South Wind "978" Preheats, Heats and
Defrosts Army Vehicles Even at 70° Below**

Keeping vital equipment functioning . . . skilled personnel warm under the severest weather conditions: It's one of many problems faced by the nation's new, more mobile, harder striking armed forces. A problem now successfully solved by an amazing new military heater—the South Wind "978."

Simplified in design. Compact. This rugged forced air heater preheats, heats, and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

Built to Army Ordnance Specifications, the "978" has been standardized by the Army for its winterization program. And, because of its many exclusive advantages, promises to be influential in fashioning future designs for commercial car heating, too.

IMPORTANT: For complete details *plus* experienced engineering assistance, wire, write or phone Stewart-Warner Corporation, South Wind Division, Dept. E-121, 1514 Drover Street, Indianapolis 7, Indiana.

STEWART-WARNER

PERSONNEL HEATING

ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

South Wind

REG. U. S. PAT. OFF.

(Continued from page 138)
Continental Motors Corp., Muskegon, Mich.
 Spare parts—var.—\$80,000
Cummins Engine Co., Inc., Columbus, Ind.
 Repair parts—over \$250,000
Curtiss Propeller Div., Curtiss-Wright Corp., Caldwell, N. J.
 Propeller blades—\$54,302

— D —

Dana Corp., Gear Specialty Div., Toledo, Ohio
 Equipment—over \$250,000

Deepfreeze Appliance Div., Motor Products Corp., North Chicago, Ill.
 Equipment—over \$250,000

Delco Products Div., General Motors Corp., Dayton, Ohio
 Facilities—over \$250,000

Detroit Diesel Engine Div., General Motors Corp., Detroit, Mich.
 Repair parts—over \$250,000
 Repair parts—128492—\$190,388
 Spare parts—var.—\$29,800

Douglas Aircraft Co., Inc., El Segundo Div., El Segundo, Calif.
 Parts for AD—over \$250,000

Douglas Aircraft Co., Inc., Santa Monica, Calif.
 Collar assy.—60 ea.—\$26,796

— E —

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
 Maintenance parts—505 ea.—\$51,044
 Accelerometers—over \$250,000
 Starters—\$46,661
 Generators—over \$250,000
 Indicator—\$111,033

The Electric Auto-Lite Co., Toledo, Ohio
 Parts—\$79,604

— F —

Fairbanks Morse & Co., Chicago, Ill.
 Spare parts—\$40,810

Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.
 Equipment—over \$250,000

Federal Industries, Inc., Detroit, Mich.
 Vehicle parts—over \$250,000

Felt Products Mfg. Co., Chicago, Ill.
 Vehicle parts—35800 ea.—\$79,212

Firestone Tire & Rubber Co., Los Angeles, Calif.
 Tires and tubes—\$56,862

Foot Brothers Gear & Machine Corp., Chicago, Ill.
 Facilities—over \$250,000

Ford Division, Washington, D. C.
 Truck, panel—75 ea.—\$157,112

Ford Motor Co., Dearborn, Mich.
 Equipment—over \$250,000
 Equipment—over \$250,000

Fruehauf Trailer Co., Detroit, Mich.
 Bomb dollies—76 ea.—over \$250,000
 Tank, truck—ea.—\$176,130

— G —

General Electric Co., Johnson City, N. Y.
 Facilities—over \$250,000

General Electric Co., Lockland, O.
 Equipment—over \$250,000

General Electric Co., Phila., Pa.
 Indicators—202 ea.—\$63,334
 Services and material—over \$250,000
 Services and material—15 ea.—\$28,800

General Electric Co., Schenectady, N. Y.
 Assemblies—\$140,000
 Fire control systems—\$100,000

General Electric Co., Syracuse, N. Y.
 Components—195 ea.—over \$250,000

General Motors Corp., Detroit, Mich.
 Equipment—over \$250,000
 R-3350 Engines—over \$250,000

General Motors Corp., Plymouth, Mich.
 Equipment—over \$250,000

GMC, Chevrolet Mtr. Div., Detroit, Mich.
 Trucks—22 ea.—\$33,109

1 set

Trucks—over \$250,000

Trucks, pickup—over \$250,000

Truck, pickup—54 ea.—\$79,409

Truck, pickup—25 ea.—\$72,240

Truck, carryall—27 ea.

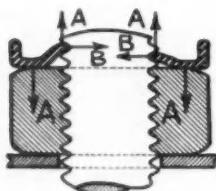
Truck—over \$250,000

Trucks—over \$250,000

Truck stake—over \$250,000

Truck stake—over \$250,000

(Turn to page 142, please)



Powerful spring tension (A A) is exerted upward on the bolt threads and downward on the ordinary nut, while slotted jaws (B B) close in and grip the bolt like a chuck.

Because PALNUT Lock Nuts apply on top of ordinary nuts, there are no interfering parts within the nut or between the nut and load to prevent or retard the full application of bolt stress for maximum bolt loading efficiency. A properly tightened nut, locked with a PALNUT, provides a completely vibration-proof, rugged assembly which stays trouble-free during the entire life of your products.

With all these benefits, PALNUT Lock Nuts are very low in cost and speedily applied.

Widely used on:

Connecting rods, brake parts, exhaust manifold, body hold down, engine mounting, shock absorber mountings, main bearings, etc.

Write for samples and data

PALNUT
Trademark
LOCK NUT

THE PALNUT COMPANY
 60 Cordier St.
 Irvington 11, N. J.
 Detroit office:
 730 West Eight Mile Rd., Detroit 20, Mich.

2 DRAWS

ADVANCE TOOLING



Depth Bomb part drawn with
Advance Dies from 31½" steel blank.

THIS DIFFICULT STAMPING SIMPLIFIED BY NEW ADVANCE TOOLING METHOD

Here's another example of ADVANCE tooling ingenuity. The problem: This depth bomb tail piece deep-drawn to the dimensions shown above . . . in just two draws . . . from a 14-gauge steel blank. Similar pieces were formerly produced with five or six draws, or by butt-welding two halves.

Advance tooling techniques met the requirements — with dies that produced the part in two draws as specified. Advance can help you with your difficult drawing and stamping problems . . . and save you time and money in your processing operations. Our engineers and our completely equipped die plant are ready to serve you. Consult us — or write for complete information.

Write for
Illustrated
Descriptive
Bulletin



ADVANCE DIE & TOOL CO.

6800 MADISON AVENUE

CLEVELAND 2, OHIO

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BRANDT

COMPLETE PRODUCTION FACILITIES SPEED-UP DEFENSE CONTRACT WORK*

Brandt's production lines are geared for mass production of component parts for prime and sub-contract defense work.

Brandt's proximity to steel mills and rail and water transportation assures on-time delivery.

*Regardless of stepped-up defense production, our industrial accounts still receive prime consideration.

WRITE TODAY

on your company letterhead for your copy of this handy file of Brandt mass-production facilities for all kinds of metals.

METAL STAMPINGS HEAVY WELDMENTS PRESSED STEEL SHAPES

in

Stainless Steel, Carbon
Steel, Aluminum and
other alloys.



CHARLES T. BRANDT, Inc.

1700 Ridgely St.
BALTIMORE 10, MD.



(Continued from page 140)
General Motors Corp., Cleveland Diesel Engine Div., Cleveland, O.
Conversion kits—over \$250,000
Repair parts—\$28,156
Repair parts—\$44,192

General Motors Corp., Harrison Radiator Div., Lockport, N. Y.
Repair parts—over \$250,000

General Motors Corp., Packard Electric Div., Warren, Ohio
Harness assemblies—\$25,268

General Motors Corp., United Motors Service Div., Detroit, Mich.
Repair parts—\$2970—\$31,099
Spare parts—var—\$160,000

B. F. Goodrich Co., Dayton, Ohio
Wheel assemblies—over \$250,000
Wheel & brake assys.—over \$250,000
Spare parts—\$100,000

The B. F. Goodrich Co., Los Angeles, Calif.
Tires and tubes—\$63,384

The Goodyear Tire & Rubber Co., Inc., Akron, Ohio
Spare parts—over \$250,000
Casing—\$130,541

Wheel & brake assy.—over \$250,000
Wheel assembly—904 ea.—\$106,422
Wheel assembly—\$30,243
Wheel and brake assy.—over \$250,000
Wheel & brake—over \$250,000

Griffin Eng. Co., Inc., Worthington, Ind.
Vehicle parts—750 ea.—\$44,393

Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y.
Parts for F7F—2760 ea.—\$49,379
Parts for JRF-5—9 ea.—\$20,300

— H —

Harnischfeger Corp., Milwaukee, Wis.
Spare parts—\$61,600

Hayes Aircraft Corp., Birmingham, Ala.
Services—over \$250,000

Houde-Hershey Corp., Decatur, Ill.
Equipment—over \$250,000

Houde-Hershey Corp., Houde Engineering Div., Buffalo, N. Y.
Shimmy damper—var. ea.—\$26,214

Hudson Motor Car Co., Detroit, Mich.
Facilities for B-47B, RB-47B
and B-47—over \$250,000

— I —

International Harvester Co., Evansville, Ind.
M1 rifles & spare parts—over \$250,000
Design development—\$173,813

International Harvester Works, Louisville, Ky.
Facilities—over \$250,000

International Harvester Co., Melrose Park, Ill.

Spare parts—97 items—\$68,559

Spare parts—var—\$43,500

Spare parts—var—\$27,000

Spare parts—var—\$30,000

Spare parts—var—\$28,600

Spare parts—\$27,700

Tractors—145 ea.—over \$250,000

International Harvester Co., Washington, D. C.

Crawler tractor—1—\$29,750

Truck, wrecker—9 ea.—\$34,058

Truck—28 ea.—\$47,292

(Turn to page 144, please)

IF YOU COULD SEE A DoALL

surface grinding demonstration



"COOL GRINDING" MULTIPLIES DoALL GRINDING EFFICIENCY

With the DoALL "Cool Grinding" attachment,* coolant flows through the wheel and out in a fine mist at the point of work. This gives:

1. Faster stock removal.
2. Accurate dimensional control.
3. Freedom from cracks or burns.
4. Longer wheel life.

You can do precision grinding faster and better with DoALL "Cool Grinding." No special wheels, tanks or pumps needed. Ask about it!
Opel. No. (2470350)

SEND FOR BULLETIN



33
SALES-SERVICE
STORES

YOU would witness DoALL precision surface grinders do *any* surface grinding job better, faster. You could run this test:

1. Take a .020" cut in a piece of hardened tool steel. Halfway across the work reverse the crossfeed and you'll find NO "sparkout." Work is ground flat in one operation. The machine is so rigid you can take a heavy cut without fear of spindle "give" or "spring."
2. Stop the work under the wheel and without raising wheel stop the motor. The wheel coasts to a stop without touching the work surface. It took all the metal intended in one clean pass.
3. Pencil mark the work surface. By lowering the wheel .0001" only the pencil marks are removed. DoALL grinders are rigid but when you adjust the vertical column support the machine obeys—no "hang up."



YOU can have this demonstration FREE in your own plant, at your convenience. See for yourself how DoALL rigid precision hydraulic surface grinding can help you. Ask for FREE DEMONSTRATION. Call your DoALL Store or write:

The DoALL Company
254 N. Laurel Ave.
Des Plaines, Ill.

DoALL

INDUSTRY'S
NEW
TOOLS



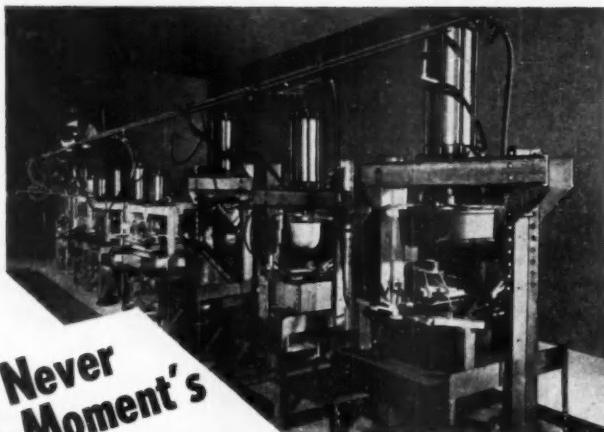
Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies

(Continued from page 142)

Chassis, truck—112 ea.—\$137,277
Chassis, truck—10 ea.—\$44,859
Truck, dump—over \$250,000

— J —

Jack & Heintz Precision Industries, Cleveland, Ohio
Equipment—over \$250,000
Jacobs Aircraft Engine Co., Pottstown, Pa.
Equipment—over \$250,000
Kaiser-Frazer Corp., Willow Run, Mich.
Facilities for C-123—over \$250,000



"Never a Moment's Delay — since first installed in 1945" says user of NOPAK Valves and Cylinders

Regal Plastic Co., Kansas City, Mo., . . . a leader in its field . . . installed NOPAK Valves and Cylinders on a battery of presses used in draw-forming sheet plastics. They report that this NOPAK equipment "has never caused a moment's delay in production since first installed."

The chief requirements of this application are medium power combined with flexibility in set-up and in stroke length. Downstroke of the press, controlled at varying speeds, is followed by a dwell of 1 to 20 minutes and careful withdrawal of punch from finished part.

NOPAK Air-Cylinder Power has provided the required versatility, in that set-ups can be changed quickly, and fast application or release of pressure is easily accomplished.

GALLAND-HENNING MFG. CO., 2774 S. 31st St., Milwaukee 46, Wis.

For Technical Data on NOPAK Valves and Cylinders, write for Bulletin SW-1, or refer to Swast's File for Product Designers.

Representatives in Principal Cities

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

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FROM 50 YEARS' EXPERIENCE

ONE FACT STANDS OUT...

*There is no universal
Bearing Material*

Two automotive engines may appear to be alike, yet their operating needs might call for entirely different types of sleeve bearings. For one, tin-base babbitt linings are best; the other, copper-lead alloy. Excavating machines, tractors, pumps, compressors, electric motors, marine engines and Diesels—each has specific bearing needs. These must be met by the ONE best-suited alloy. That's why our six manufacturing plants produce bearings in a great range of alloys and sizes—from an ounce or two in weight to units of hundreds of pounds each.

FEDERAL-MOGUL CORP., 11037 SHOEMAKER, DETROIT 13, MICH.



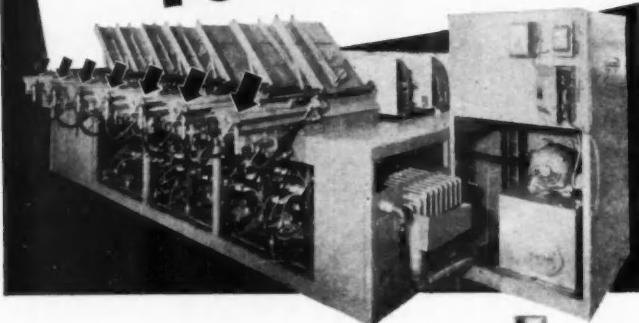
since 1899

Six plants producing sleeve bearings in all designs and sizes; cast bronze bushings;

rolled split-type bushings; washers, spacer tubes, precision bronze parts and bars.

Job File No. 3259

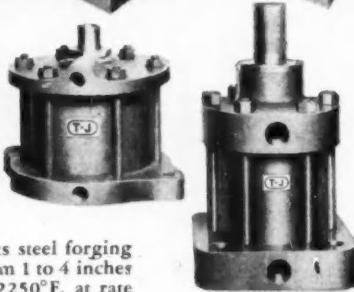
Feeds Automatically WITH T-J CYLINDERS



T-J Hydraulic Cylinders furnish efficient, automatic "push power" for feeding devices in this new Ajax-Northrup induction forge heating equipment.

This unit—manufactured by Ajax Electro-thermic Corp., Trenton, N. J.—automatically heats steel forging stock in sizes ranging from 1 to 4 inches (rounds or squares) at 2250°F. at rate of 7500 to 8500 lbs. per hour. Has space for 8 heating stations . . . each with hydraulically operated billet feeding devices employing T-J Cylinders. These cylinders also eject heated bars automatically. Induction heating with this equipment results in uniformity of successive billets fed to the forge—thus controlling quality of finished forgings and reducing rejects.

Do you have a tough job in power movement—pushing, pulling or lifting? Let T-J help you simplify machines, save labor and cut costs by using T-J Air or Hydraulic Cylinders! Many standard sizes and styles . . . cushioned or non-cushioned . . . 100 lb. or 50,000 lb. Precision-built, long life. Write for more information. The Tomkins-Johnson Co., Jackson, Mich.



FOR POWER MOVEMENT IN ANY DIRECTION



100 LBS. or
50,000 LBS.

35 YEARS EXPERIENCE

TOMKINS-JOHNSON

RIVITORS, AIR AND HYDRAULIC CYLINDERS, CUTTERS, CLINCHORS



(Continued from page 144)
**Republic Aviation Corp., Farmingdale,
L. I., New York**

Equipment for F-84F—over \$250,000
Rett Products Co., Detroit, Mich.
Spare parts—2000—\$244,860

Rogers Brothers Corp., Albion, Pa.
Trailer—over \$250,000

Ryan Aeronautical Co., San Diego, Calif.
Equipment—\$35,000

— S —

**Scintilla Magneto Div., Bendix Aviation
Corp., Sidney, N. Y.**
Magneto and ignition—over \$250,000

Skinner Engine Co., Erie, Pa.
Repair parts—1588—\$116,809

Solar Aircraft Co., San Diego, Calif.
Spare parts—\$25,000

**The Speer Gyroscope Co., Great Neck,
Long Island, N. Y.**
Auto pilot—\$120,000

**Springfield Tent & Awning Co., Springfield,
Ohio**
Vehicle parts—over \$250,000

Sterling Engine Co., Buffalo, N. Y.
Repair parts—over \$250,000

Sewart Warner Corp., Indianapolis, Ind.
Winterization kits—600—\$148,290
Repair parts—11160—\$28,772
Winterization kit—1000—\$224,500

**Stratos Div., Fairchild Engine & Airplane
Corp., Farmingdale, L. I., N. Y.**
Services and material—var. ea.—\$25,000

Surface Combustion Corp., Toledo, Ohio
Heater assembly—146 ea.—\$28,324

— T —

Thompson Products, Inc., Cleveland, Ohio
Equipment—over \$250,000

Timken Roller Bearing Co., Canton, Ohio
Spare parts—var.—\$45,500

**Truck & Coach Div., General Motors
Corp., Pontiac, Mich.**

Truck, ambulance—over \$250,000
Truck—5 ea.—\$34,054
Truck, dump—49 ea.—\$27,182
Chassis, truck/w/—10 ea.—\$27,578
cab

— U —

Union Carbide & Carbon, Kokomo, Ind.
Jet engine components—over \$250,000

**The Union Diesel Engine Co., Oakland,
Calif.**

Repair parts—23200—\$96,775

**United Aircraft Corp., Chance Vought
Aircraft Div., Dallas, Texas**
Equipment—2036 ea.—\$174,202
Spare parts—1952 ea.—\$175,117
Maintenance parts—32 ea.—\$214,658
Maintenance parts—1060 ea.—\$74,052
Parts for F4U—over \$250,000
Parts for F4U-4B—over \$250,000

**United Aircraft Corp., Hamilton Standard
Div., East Hartford, Conn.**
Spare parts—over \$250,000
Maintenance tools—over \$250,000
(Turn to page 148, please)

DoALL'S PHENOMENAL EVOLUTION



HOW CONTOUR MACHINING WAS DEVELOPED INTO ONE OF THE MOST VERSATILE AND ECONOMICAL MACHINING PROCESSES KNOWN TO INDUSTRY

WHEN the idea of "Contour Sawing" was first introduced, the DoALL was primarily recognized for its speed in cutting dies. Great savings in time and material resulted wherever this new principle of slicing off a whole section (instead of removing one chip at a time) was used. As a result, uses for this revolutionary machining process began to multiply immediately.

New application possibilities prompted new developments in machines and, of necessity, in band tools to be used with them. For example, blade life was increased from 23 minutes to 300 minutes in slicing through 1" thick tool steel.

These improvements opened up further new production applications. With the increase in applications and better band tools, much heavier machine construction, closer control of feeds, speeds, etc., along with use of coolants, became necessary.

Today the DoALL employs 27 different kinds of band tools, so that on the Contour-matic every known material can be machined. One of these band tools, for example, is a high-speed band carrying abrasive stones which achieves another revolutionary machining process called "Line Grinding." Instead of merely cutting from a point tangent to a round wheel, the Line Grind Bands do precision grinding in hardened steel over the entire face of a curved or flat area.

There are bands for not only sawing, but filing, grinding and polishing operations. There are bands for friction sawing of ferrous materials, knife bands for parting rubber, paper and pliable substances. There are bands with diamonds impregnated on the edge for cutting ceramics and other brittle materials.

The new DoALL with its many cutting tools is today the most versatile of all machine tools. We invite your inquiry for a demonstration in your plant on your work to prove these claims.

The DoALL Company
254 N. Laurel Ave., Des Plaines, Illinois

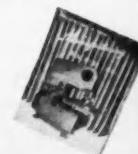
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Learn of the complete machining facilities available to you in the modern DoALL Contour-matic.

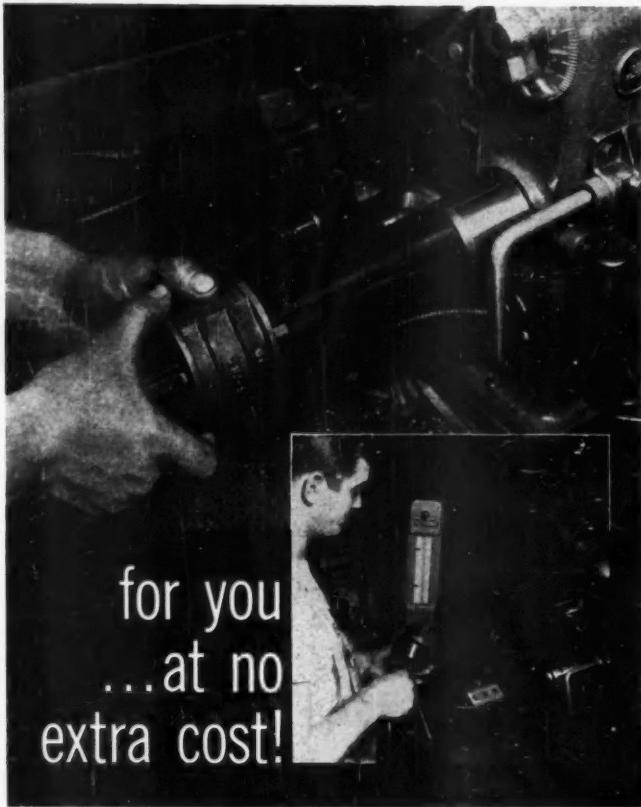
B-8
DoALL

33 Sales-Service Stores

CALL DoALL FOR:



Machine Tools . . . Gaging Equipment . . . Tool Steel . . . Band Tools . . . Metal Working Supplies



for you
...at no
extra cost!

LONGER TOOL SERVICE LIFE... LOWER TOOL MAINTENANCE COSTS

Now, on every Buckeye air tool, cylinders are carefully honed to an exacting tolerance of just .0005" to provide greater contact area, insuring longer tool service life and lower tool maintenance costs.

From the 1" diameter cylinders in the compact, powerful Buckeye "A" Series, to the 2 1/4" cylinders in the husky Buckeye "F" Series, every cylinder is hardened and ground in the customary manner, then honed to mirror smoothness.

This extra production process, typical of Buckeye "Quality First," is just one reason why so many air tool users have found the best buy is Buckeye. If you're still choosing air tools by tradition or habit, better see what you've been missing—try Buckeye in your plant, without obligation.

Buckeye Tools
CORPORATION
DIVISION 21 • DAYTON 1, OHIO

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

Portable Air
and Electric tools
for Industry

(Continued from page 146)

Propeller parts—4000 ea.—\$36,800
Propeller parts—141 ea.—\$27,547
Propeller equipment—202 ea.—\$40,639
Maintenance tools—over \$250,000

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford, Conn.

Spare parts—over \$250,000
Spare parts—35495 ea.—\$128,819
Spare parts—7450 ea.—\$84,652
Spare parts—over \$250,000
Spare parts—over \$250,000
Spare parts—4016 ea.—\$114,054
Spare parts—3133 ea.—\$34,776
Spare parts—over \$250,000
Spare parts—43618 ea.—\$40,129
Spare parts—109 ea.—\$32,967
Spare parts—over \$250,000
Engine parts—2000 ea.—\$29,305
Spare parts—4016 ea.—\$114,054
Engine parts—over \$250,000
Engine parts—over \$250,000

United States Rubber Co., Detroit, Mich.
Casing—\$137,712

United States Rubber Co., Los Angeles, Calif.
Tires—\$178,038

— W —

Ward LaFrance Truck Corp., Elmira, N. Y.
Truck cab assys—\$128,541

Waukesha Motor Co., Waukesha, Wis.
Spare parts—var—\$77,750

Westinghouse Electric Corp., Dayton, O.
Generators—343 ea.—\$171,915

Woodhouse Chain Wks., Trenton, N. J.
Vehicle parts—7580 ea.—\$39,416

Wright Aeronautical Corp., Curtiss-Wright Corp., Wood-Ridge, N. J.
Engine cams—6300 ea.—\$70,445

NEW PRODUCTS

For additional information please use coupon on page 62

(Continued from page 98)

panel, indicates pounds per square inch on the ram. Stroke is six in. Maximum daylight opening is 20 in. Longer columns can be supplied.

A claimed feature of this model is the distinct paralleling of the platens. The electrically heated platens are circular, 11 in. diam, width between columns is 14 in. Height is 48 in.

A bimetallic type of temperature regulator and relayed load method is used. A pilot light mounted in the control panel indicates the functioning of the thermostat.

F-131—Filter Cloth

Cloths of dynel, a textile fiber produced by Union Carbide and Carbon Corp., New York, N. Y., are being used for diaphragms in large copper-plating tanks. The dynel diaphragms act as filters for the alkaline plating solution. (Turn to page 154, please)

Announcing the CONTINENTAL-TURBOMECA Family of

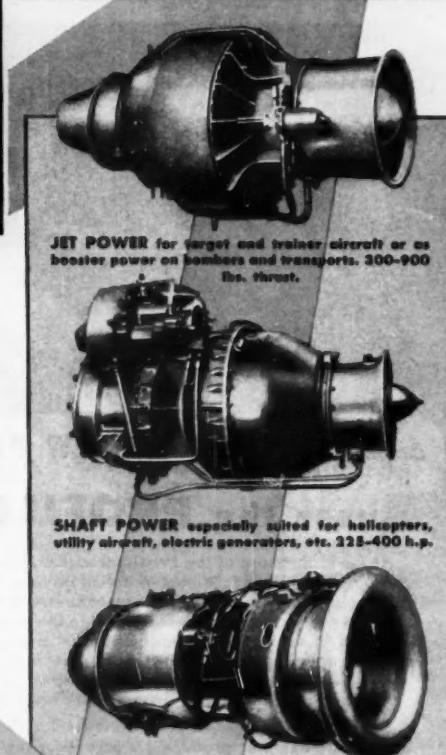
Continental Motors, pioneer in power for business and utility aircraft, announces another major pioneering step — its purchase of the exclusive United States manufacturing rights to a series of gas turbine models developed by the Societe Turbomeca, under sponsorship of the French Air Ministry.

The agreement with Turbomeca, climaxing months of technical work, testing and negotiation, in this country and in France, brings to the United States a far broader and more diversified line of turbines, in the 200-to-1,100 h.p. range, than has been available heretofore. Characteristics forecasting their widespread use include:

- Small size and low weight in relation to power.
- Adaptability to all fuels, including those of low grade.
- Long life expectancy due to simplicity of design.
- Minimum use of critically scarce materials in their manufacture.
- A high degree of parts interchangeability among various models.
- Versatility. Useful power is delivered in any of four different ways.

Continental Motors sees this Continental-Turbomeca family of engines as supplementing, rather than displacing, power plants of conventional design. The four basic models and their variations are expected to find wide acceptance, not only in military applications, but in many commercial fields as well.

The Continental-Turbomeca family of gas turbines has been exhaustively tested in actual use. Plans for manufacture soon will be announced. Meanwhile, inquiries are welcomed. Please address Continental Motors Corporation, 1500 Algonquin Avenue, Detroit 14, Michigan — Attention Mr. Whitney Collins.



JET POWER for target and trainer aircraft or as booster power on bombers and transports. 300-900 lbs. thrust.

DUCTED FANS with wide potential utility as means of increasing speeds of small and medium-sized military and civilian utility aircraft. 300-800 lbs. thrust.



AIR COMPRESSOR supplying up to 2,000 cu. ft. of air per minute at 50 psi. Useful as starter for large aircraft turbines, as portable heater, or for operating pneumatic tools, particularly where lightness and compactness are required.

Continental Motors Corporation

DETROIT AND MUSKEGON, MICHIGAN

Business Pulse

(Continued from page 58)

Hours of Set-Up Time Saved!



because **LUNDBERG SCREW PRODUCTS CO.**
uses the **PROFILOMETER**

Prior to their use of the Profilometer, Lundberg Screw Products Company, Lansing, Michigan, relied on "human-element" determination of surface finishes as machine set-ups were being made. The surface roughness to be secured in the production run usually rested in an agreement reached in discussions between the machine operator, foreman, inspector, chief inspector and engineering department. As decisions were being made, machines were idle and man-hours were unnecessarily wasted.

Today, in this large, modern screw machine products plant, *every* machine operator producing a part requiring a specified surface finish personally uses the Profilometer as he makes his set-up. Before he runs any pieces in production, *he knows his finish is right*, measured in microinches RMS . . . and is not required to consult a superior or any other department. By comparison with former procedure, on centerless grinding operations, as an example, Lundberg estimates that *a minimum of 30 minutes is saved on each set-up*. And with responsibility for surface finish placed where it belongs—at the machine—rejections of parts in final inspection (where the Profilometer is also used) are negligible.

In your plant, too, the Profilometer can offer similar savings in time and money.

To learn how the Profilometer can help cut costs in your production, write today for these free bulletins.

Profilometer is a registered trade name.



PHYSICISTS RESEARCH COMPANY
Instrument Manufacturers

ANN ARBOR 12 • MICHIGAN

Improved Retail Trade

A corresponding improvement is shown in retail trade. The Department of Commerce has reported that retail store sales in October totaled \$13.1 billion, or about 1.5 per cent more than in September, after seasonal adjustments, which would place sales about six per cent higher than during the same period last year. There is some likelihood that November sales also will advance, after seasonal adjustments. Some retail specialists are predicting that Christmas sales will be 10 per cent greater than in 1950.

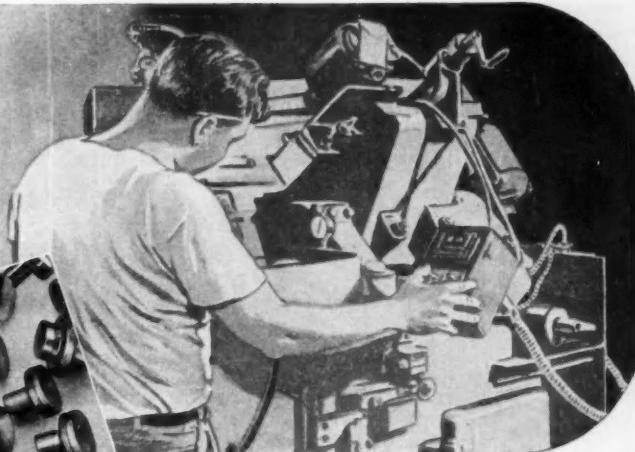
Inflation continues to be a source of concern, despite the fact that the inflationary pressure predicted earlier in the year by many Government and private economists had clearly not developed by autumn. The current relative stability of price levels is generally attributed to consumer apathy and slower-than-expected defense payments. Some official and private sources now maintain, however, that next spring will be the critical period.

Those who believe that inflation may present a serious challenge to the national economy point to certain current trends which are expected to broaden over the next half year. Personal income in September was at an annual rate of \$253.3 billion, and for the first nine months of the year it was at a rate of \$248.8 billion. This was some 13 per cent above the total for the corresponding period in 1950. Many economists believe that the level of personal income will continue to rise as firms complete conversion to defense production and as current soft areas, such as textiles, raise production rates. Furthermore, it is expected that the wage and salary component of personal income will increase as a consequence of longer hours and overtime payments. It is widely doubted that consumers will continue to save nine per cent of their disposable income, which is regarded as an abnormally high figure.

Defense Spending

Whether or not these predictions materialize is thought to depend on the future pattern of defense spending by Government agencies. Such spending is now running well over \$40 billion at an annual rate, and procurement is at a rate of \$20 billion. Present schedules call for deliveries of military equipment to rise to an annual rate of \$52 billion by next September. Such expenditures at a time when greater amounts of available supplies were being withdrawn from civilian production could undoubtedly be of great potential danger. According to the Senate Preparedness Committee defense

**Service
Beyond
The Sale!**



**Mallory Perfects
Precision Production
*of True Radius Contacts***

TUNGSTEN CONTACTS

Tungsten is used in contacts for electrical equipment where resistance to arcing and wear are important. Mallory has developed numerous alloys to meet every contact requirement. Among the many Mallory contact materials are the Elkonites* and Elkonium* alloys. Mallory will gladly work with you to find the right contacts to meet your specifications. Write today.

*Reg. U.S. Pat. Off.

Many new techniques for the production of better, lower cost contacts are developed by continuing Mallory research and engineering.

A recent Mallory contribution is a radically different type of grinding machine capable of meeting the need for extreme precision in true radius tungsten contacts, with a very smooth finish. Previous grinding practice permitted a radius tolerance of no closer than $\pm \frac{1}{16}$ " . . . now the tolerance can be held to $\pm \frac{1}{4}$ ", even on a mass production basis. And, the finish will not exceed 8-10 micro inches roughness. In addition, the contact has a true spherical radius, without the usual flat area at the crown. This Mallory designed and engineered equipment does a far better job . . . yet the cost is no more, in some cases is less.

That's service beyond the sale!

Mallory contact know-how is at your disposal. What Mallory has done for others can be done for you!

In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario.

Electrical Contacts and Contact Assemblies

P.R. MALLORY & CO., Inc.
MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Electromechanical Products

**Resistors Switches
TV Tuners Vibrators**

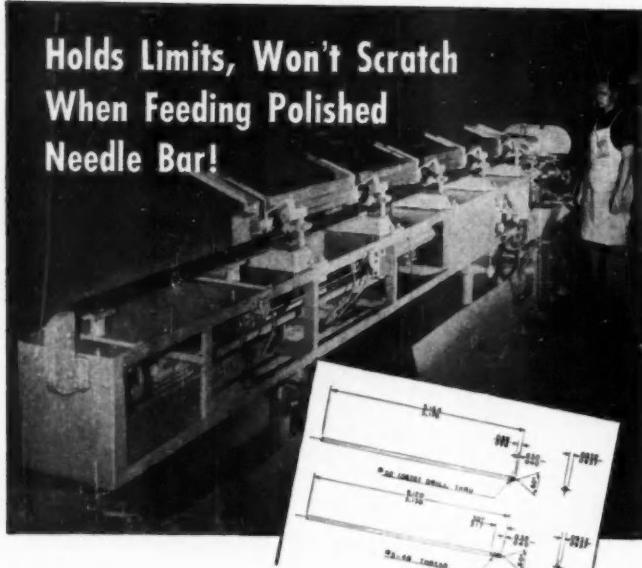
Electrochemical Products

**Capacitors Rectifiers
Mercury Dry Batteries**

Metallurgical Products

**Contacts Special Metals
Welding Materials**

Holds Limits, Won't Scratch When Feeding Polished Needle Bar!



Screw Machine Foreman emphasizes advantages of
LIPE *Automatic Magazine Loading*
BAR FEED

In a recent letter to Mr. H. L. Burlingame, Screw Machine Foreman at Friden Calculating Machine Co., Inc., San Leandro, Calif., we asked how much had his new Lipe Bar Feed increased production on a B&S #00G. This was his reply:

"To be perfectly frank, when we first installed your air feed attachment, it was not with the idea of increasing production but to find some way to handle polished needle bars in order to hold length and eliminate feed finger scratches.

Feed Finger Savings Pay For Bar Feed

"In checking our records on parts #80011 and #80011-T (above), we find that originally using feed fingers, we produced approximately 300 pieces an hour. Upon the introduction of your Automatic Magazine Feed, we have

- Lipe Automatic Magazine Loading Bar Feed will . . .
 - Feed automatically to the smallest remnant.
 - Accurately feed any required distance.
 - Handle exact-size polished stock without marring or scratching.
 - Reduce scrap loss.
 - Eliminates feed finger replacement and repairs.

Write today for further information.



Life - BALTIMORE CORPORATION

RODEWAG CORPORATION
Manufacturers of Automotive Clutches and Machine Tools

spending is currently behind schedule, however, and there is no certainty that the goals set for next year will be achieved. Moreover, in view of the recent tax increases there is some question as to whether consumers will alter the pattern of present buying.

A further imponderable in the outlook for inflation is the Capehart amendment to the Defense Production Act. When it was implemented by the Office of Price Stabilization in November, there seemed to be some confusion as to its actual effect on the over-all price structure. Michael V. DiSalle, Price Stabilizer, said the new orders would result in "a generally higher level of manufacturers' prices." Other price officials apparently believed that higher price ceilings, though not necessarily higher prices, could be expected, while a third group within the agency was reported as believing that the eventual outcome of the new amendment and the accompanying orders was indeterminate.

Ceiling Prices

The new orders affect manufacturers controlled by Ceiling Price Regulations 22 and 30—estimated by the agency to comprise a quarter of the nation's manufacturing concerns. Included among them are manufacturers of machinery and allied products and a long list of consumer items. Under the recent regulations manufacturers may calculate their price ceilings under the original orders 22 and 30 or under the regulations framed to comply with the Canehart amendment.

The former ceilings based permissible manufacturers' prices on the highest prices charged in the year before the Korean war began. These were adjusted for later shifts in labor and materials costs. No provision was made for changes in overhead costs, nor are allowances made for increased advertising, selling and other similar costs in ceiling calculations under the original regulation.

The "Capehart" orders appear to offer many manufacturers an opportunity to revise pricing schedules so as to conform with current costs. The affected producers may, if they choose, include advertising, selling, and operating expenses among the factors which determine the final ceilings for their products. The "cut-off" dates used in figuring labor and materials cost changes have been moved ahead to July 26, 1951, from the original deadlines of December 31, 1950, for materials and March 15, 1951, for labor. Thus higher costs in the intervening four-to-six-month period would be reflected in the ultimate ceiling price. In addition, there are provisions for adjusting ceilings to allow for increases in the amount of overtime paid and for advances in the costs of subcontracting. Of special service to the manufacturer is the provision allowing price adjustments to reflect increases in certain basic overhead costs.

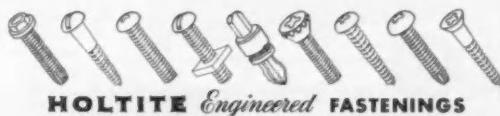


*You can count
on Continental*

CONTINENTAL SCREW COMPANY

New Bedford, Mass.

Manufacturers of famous HOLTITE-Phillips and Slotted Head
Screws and Bolts and Allied Fastenings, both Special and Standard.

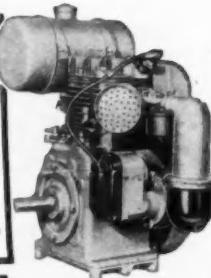


Gain More Power Advantage for Your 3 to 6 hp. Units...

Presented here are a few of the basic facts why Wisconsin Heavy-Duty Air-Cooled Engines offer important advantages to the user of power-driven equipment that has to deliver dependable on-the-job service:

1. Rotary type high tension magneto, with impulse coupling, mounted on outside of engine . . . operates as an entirely independent unit that can be serviced or replaced in a few minutes.
2. Self-cleaning tapered roller bearings at both ends of the crankshaft . . . will withstand side-pull or end-thrust without danger to bearings.
3. Maximum torque at usable speeds . . . most desirable on equipment that really has to go to work.

Your Wisconsin Engine distributor or dealer will be glad to co-operate with you in adapting Wisconsin Engines to your requirements. Write for detailed data.



Condensed Specifications

	Model ABN	Model AKN
Bore.....	2 1/2"	2 1/8"
Stroke.....	2 1/4"	2 1/4"
Piston Displ. (Cu. In.).....	13.5	17.8
HORSEPOWER		
1800 R.P.M.....	2.5	3.6
2200 R.P.M.....	3.1	4.5
2600 R.P.M.....	3.7	5.3
3000 R.P.M.....	4.2	5.9
3600 R.P.M.....	4.6	6.2
No. of Piston Rings.....	4	
Fuel Tank Cap.....	1 Gal.	
Weight, Ibs.....	Net Crated Standard Engine.....	76 89



WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN



Heat Treating FURNACES

For Ferrous and Non-Ferrous Defense Products

Let EF engineers—with their successful record during the World Wars I and II—help you convert to defense production. Our complete facilities, plus the "know-how" gained on hundreds of shell, aircraft, tank, ammunition component and other defense projects can save you time and expense. Better write us about your change-over problems today.



Gas-Fired, Oil-Fired and Electric Furnaces

for any Process, Product or Production

THE ELECTRIC FURNACE CO.

WILSON ST. at PENNA. R. R. Salem - Ohio

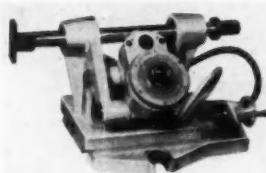
NEW PRODUCTS

For additional information please use coupon on page 62

(Continued from page 148)

Filter cloth of the fiber are said to cut time and labor required in changing diaphragms. Dynel is composed of 60 per cent vinyl chloride and 40 per cent acrylonitrile. It is produced from basic gases, salt and air in a series of 12 processing steps.

F-132—Optical Gage



The cam rise gaging device shown is designed to measure cam contours (both angle and amount of eccentricity) by optical means. It is produced by F. T. Griswold Mfg. Co., Wayne, Pa. Deviation in a cam surface at any angle of arc, from minimum to maximum radii, can be measured to 0.010 in. according to the company. For angular measurements the cam rise gage is used with a dividing head and tail stock to position the cam. The gage consists of a base for positioning and securing the instrument, a screw adjustment for moving the optical system into contact with the cam surface, a contact bar and cam follower that are held against the cam by adjustable weight tension, a scale and a microscope. A linear scale, engraved on the contact bar, is graduated from zero to three in. in 0.050 in.

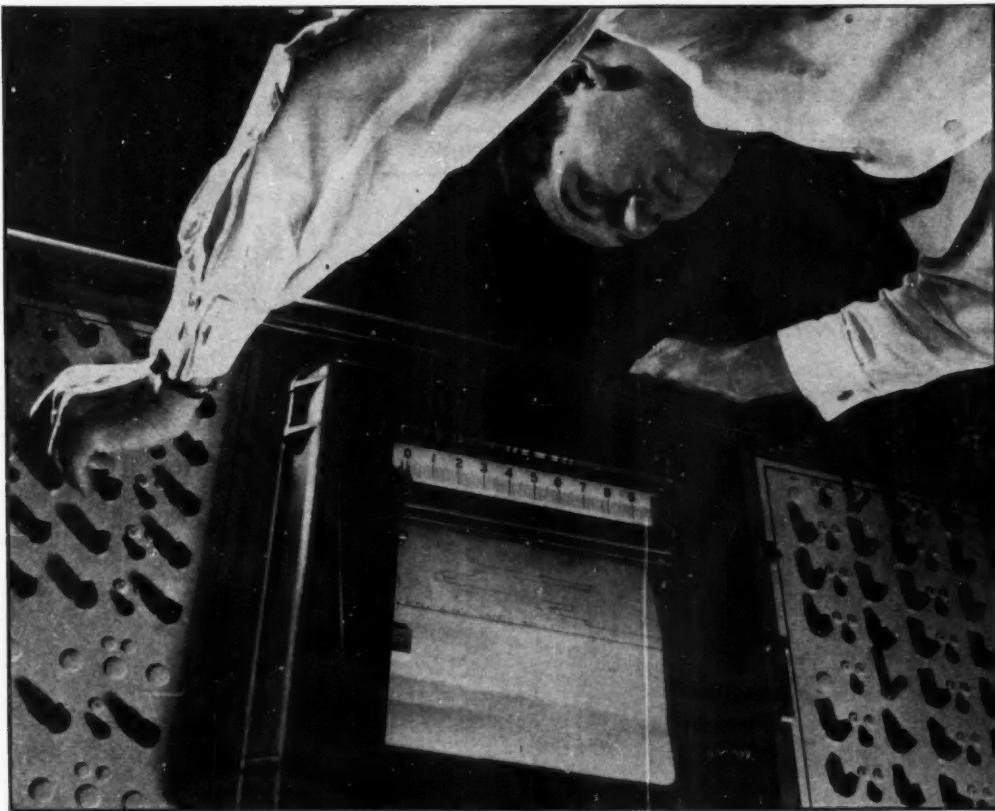
F-133—Disk-Type Magnetic Brake

Dings Brakes, Inc., a subsidiary of Dings Magnetic Separator Co., Milwaukee, Wis., has announced the availability of a line of ac or dc direct acting disk-type magnetic brakes.

According to the manufacturer, it is designed to stop any motor instantly, to hold the load, and to release with no drag. The brake is spring engaged and magnetically released and is designed to mount on Nema type C motor flanges. Typically, the units find application on machine tools, hoists, cranes, elevators, screwdowns, etc.

Friction disks, springs and magnet constitute the heart of the unit. Very high thermal ratings are claimed for the brake. Torque and wear adjust-

(Turn to page 156, please)



RIGHT from the start . . .

**Expert scientific control
makes ALUMICAST castings faultless**

There's no guesswork done at ALUMICAST. Every step from ingot to the finished casting is subject to scientific tests and controls to assure production of uniformly high quality castings. Right from the start every piece will meet your specifications.

No matter where you are located, you will find ALUMICAST a quick and dependable source for aluminum or magnesium castings. You are cordially invited to consult us relative to your civilian or defense needs.
ALUMICAST CORPORATION, 1521 N. Kilpatrick Avenue, Chicago 51, Illinois.



Illustrations above show the Quantometer which provides our laboratory technicians with a graphically recorded analysis of sixteen different elements—in less than three minutes. This assures the correct casting alloy composition in every "heat". You benefit because of expert scientific control ("E.S.C.").

ALUMICAST

ALUMINUM and MAGNESIUM PERMANENT MOLD and DIE CASTINGS

"E.S.C."

EXPERT
SCIENTIFIC
CONTROL

DEPEND ON
Mitchell
FOR THESE
SPECIALIZED
PRODUCTS

Ignition Switches
Turn Signal Switches
Rolled Shapes

Widely used by leading builders of cars, trucks, buses and tractors, Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry.



**AUTOMOTIVE
IGNITION SWITCHES**

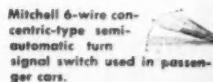
Original equipment on many popular make vehicles, Mitchell ignition switches are noted for extra long life. "Radio" position at no extra cost.

TURN SIGNAL SWITCHES

Semi-automatic, self-cancelling. Afford drivers easy, positive way to indicate turns to approaching and following traffic as well as to pedestrians.



Mitchell clamp-on and screw-type semi-automatic turn signal switch for trucks, cars, buses, tractors.



ROLLED SHAPES

Complete range of metals, designs and gauges in stainless steel, aluminum, brass, bronze, copper—cold rolled, drawn and pressed—for automobiles, airplanes, railroad cars, architectural requirements, radios, television receivers, all industrial uses.

Our sales engineers work with you in the application of Mitchell products to your specific designs. Call on us at any time.

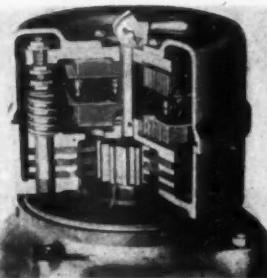
UNITED SPECIALTIES COMPANY

Mitchell Division, Philadelphia 36
 Ignition and Turn Signal Switches •
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 CHICAGO 28
 Air Cleaners • Metal Stamping

**NEW
PRODUCTS**

*For additional information please
use coupon on page 62*

(Continued from page 62)



Dings disk type magnetic brake.

ment is made by adjusting a double set of lock nuts. Visual inspection of position of manual release lever indicates when adjustment is necessary.

**F-134—Materials Handling
Racks**

Coleman-Pettersen Corp., Cleveland, Ohio, has announced the availability of model No. 441 portable, heavy-duty materials handling racks designed for the transporting and storage of small



Coleman-Pettersen materials handling racks, model 441.

assemblies and metal, rubber or plastic parts. These units hold up to 12 removable trays stacked in six rows 12 in. apart. The trays have a capacity of 70 lb each, and the racks can handle a total of 1500 lb. Measuring 24 by 31 in., the trays are said to be suitable for

(Turn to page 158, please)



**WILL KEEP YOUR ASSEMBLY
LINES AT PEAK CAPACITY**

Whatever you manufacture or assemble, you can speed production and improve your product by using Pheoll screws, bolts and nuts. These industrial fasteners drive easy and straight, and will not bind because threads are accurately rolled or machined. Precision-made screw and bolt heads, slots and head recesses prevent wrench and driver slippage. Count, too, the added bonus you receive by using fasteners that improve product appearance.

An interesting story on standard and special industrial fasteners and their profitable applications to your needs may be obtained from experienced Pheoll engineers. Ask these men to recommend screws, bolts and nuts that will increase your overall profits on assembly line work.

*these Pheoll products
prevent production lag*

Tapping Screws • Cap Screws • Sems
 • Phillips Recessed Head Screws and Bolts
 • Machine Screws • Special Fasteners •
 Thread Cutting Screws



PESCO HYDRAULIC POWER



ON FARMALL SUPER C TOO!



Small, compact, weighing only 3 lbs., Pesco hydraulic pump Model 051012 operates at 1200 psi and will pump $4\frac{1}{2}$ gal. per minute at 2800 rpm.

For rugged, dependable duty in the fields, the powerful Farmall Super C tractor is equipped with a Pesco hydraulic pump. This pump powers the hydraulic system that gives complete finger-tip control of the tillage tools . . . control that makes farm work easier . . . lessens time spent in the fields. International Harvester uses smooth Pesco hydraulic power to do the heavy work on Farmall Cub, Super A and Super C. This is because Pesco hydraulic engineers have developed hydraulic pumps that give top-flight performance with little or no maintenance.

Perhaps Pesco equipment can help your products give the dependable service that wins customer loyalty. Why not write today for full information?



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"Sound" RESEARCH**

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The high fidelity Magnetocorder lets you hear great music and history-making broadcasts as they should be heard—with all the true brilliance of "living sound."

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Magnetocorder
Professional Tape Recording Equipment
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**NOISE ANALYSIS • PROCESS CONTROL
VIBRATION TESTS • TELEMETRY**

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Dept. 1B-12, 360 N. Michigan Ave., Chicago 1, Ill.

GRC
ZINC ALLOY
WING NUTS
GET AROUND

you'll see them on

GENERAL ELECTRIC
EM-PM FOCUS COILS

... and wherever specifications call for fastenings that are rustproof • corrosion-resistant • easy to assemble and disassemble • extra easy to service • durable, dependable, attractive.

Available in all popular thread sizes and commercial finishes. Also specials made to order.

Write for samples, bulletin and prices today.

GRIES REPRODUCER CORP.

World's largest producer of die cast Wing Nuts
120 Willow Ave. N. Y. 54 • Phone: MOH Haven 5-7400



(Continued from page 156)

use on standard roller and belt type conveyors.

These racks incorporate welded tubular frame construction and can be furnished with galvanized or painted finish. The trays can be removed and the racks folded flat for storage. As an optional feature, rubber bumper guards can be furnished. The racks stand approximately 4½ ft high.

Trays can be fabricated of wire in any size expanded metal, wire mesh or sheet metal. They can be supplied in any desired depth to accommodate various types of parts or assemblies.

Vasco Super High Speed Steels for Machining Titanium

Mr. James R. Custer,
Editor,

AUTOMOTIVE INDUSTRIES,
Chestnut and 56th Streets,
Philadelphia 39, Pennsylvania

Dear Sir:

We have noted the article entitled "Machining Problems with Titanium Alloys," appearing in the November 1st issue of AUTOMOTIVE INDUSTRIES. At the bottom of the second column, on page 47, we note a reference to the machining of Titanium Alloys with our Vasco Supreme High Speed Steel. Following this reference to our brand name, you have parenthetically indicated it to be an 18-4-1 type. Such an inference is unfortunate, since 18-4-1 type high speed steels will not satisfactorily machine Titanium, except in rare instances, and since 18-4-1 high speed steels are highly restricted in usage because of the low availability of Tungsten.

Vasco Supreme and its companion, Vasco Supreme A, are super-high speed steels. They contain high carbon and Vanadium contents and as such have, in addition to high hot hardness, the highest wear resistance yet produced in a commercially forgeable material. To these qualities can be ascribed the ability of Vasco Supreme to successfully machine Titanium and some of its alloys.

We are familiar with the fact that this error in identifying Vasco Supreme originates in the booklet from which your report was abstracted, published by the Curtiss-Wright Corporation, and we have written to them concerning it. You may have permission to publish portions or all of this letter so that your readers may not err in attempting to select 18-4-1 high speed steels for machining these special materials.

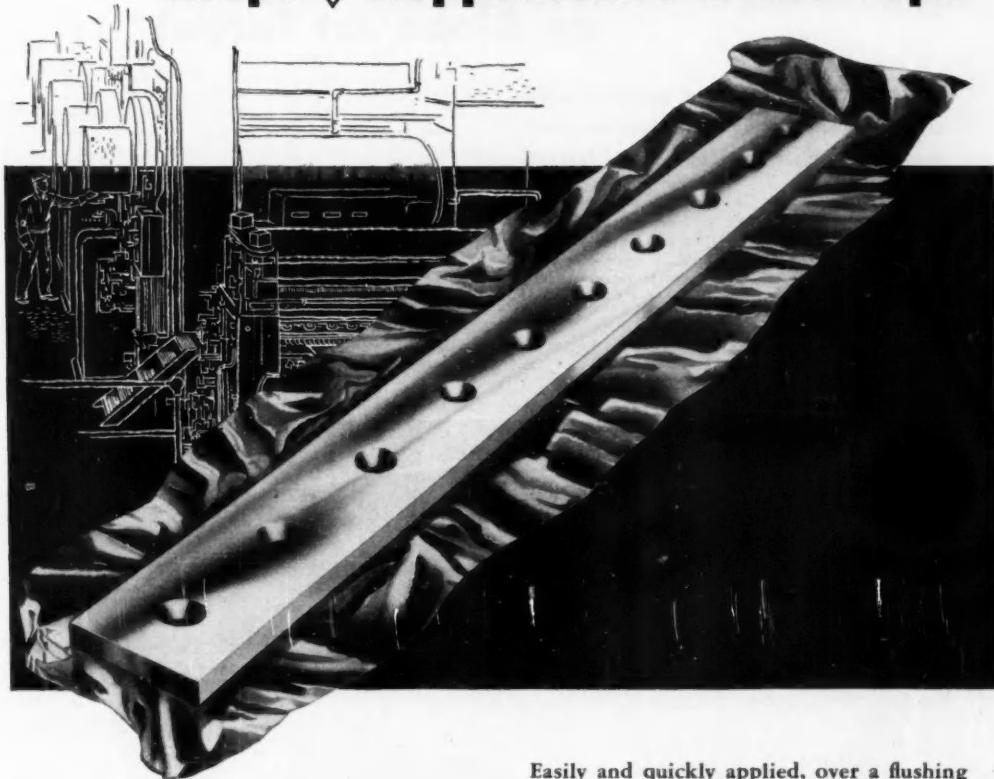
Very truly yours,

VANADIUM-ALLOYS STEEL
COMPANY.

(Signed) George A. Roberts
Chief Metallurgist

preventive packaging

in SPARKLING Alcoa Foil keeps Heppenstall's steels "tops"



Heppenstall makes top-flight steels. To see that they stay that way, they package their shear knives in Alcoa Aluminum Foil.

Before adopting Alcoa Foil, Heppenstall sometimes found customers stored their highly polished shear knives under adverse atmospheric conditions, pending installation. Corrosion resulted and knives had to be returned for resurfacing, even though they had never left their original crates.

Now, a sheath of sparkling Alcoa Aluminum Foil guards each gleaming surface.

Easily and quickly applied, over a flushing compound, it is the "ounce of prevention" that assures perfect product protection . . . from shipping—through storage—to use.

Alcoa Sales Engineers are readily available to discuss your packaging problems, to explain current Government packaging requirements. Just call your local Alcoa sales office, listed under "Aluminum" in your classified phone directory, or write:

ALUMINUM COMPANY OF AMERICA,
1765M Gulf Building, Pittsburgh
19, Pennsylvania.





SPEED NUTS score "direct hit" on Globe Jet Target

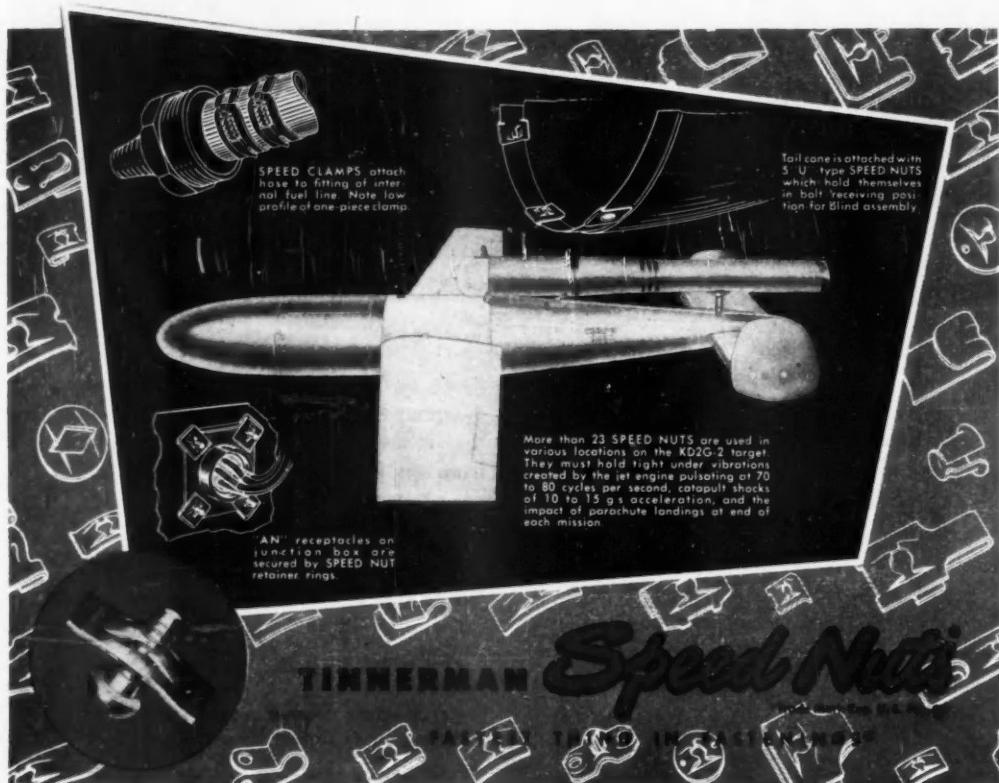
How SPEED NUTS "shot down" cost of assembly, saved time and ended vibration-loosening problems on Globe Jet Powered aircraft targets.

Speeds attained by the Globe KD2G-2 jet target are high enough to provide the realistic touch of actual air-to-air or air-to-ship attacks. This sleek craft is the result of over three years of development work by Globe Corporation, Aircraft Division, Joliet, Illinois, in cooperation with the Navy Department, Bureau of Aeronautics.

Globe engineers had to plan assembly of the target with fasteners that could take intense vibration. Of

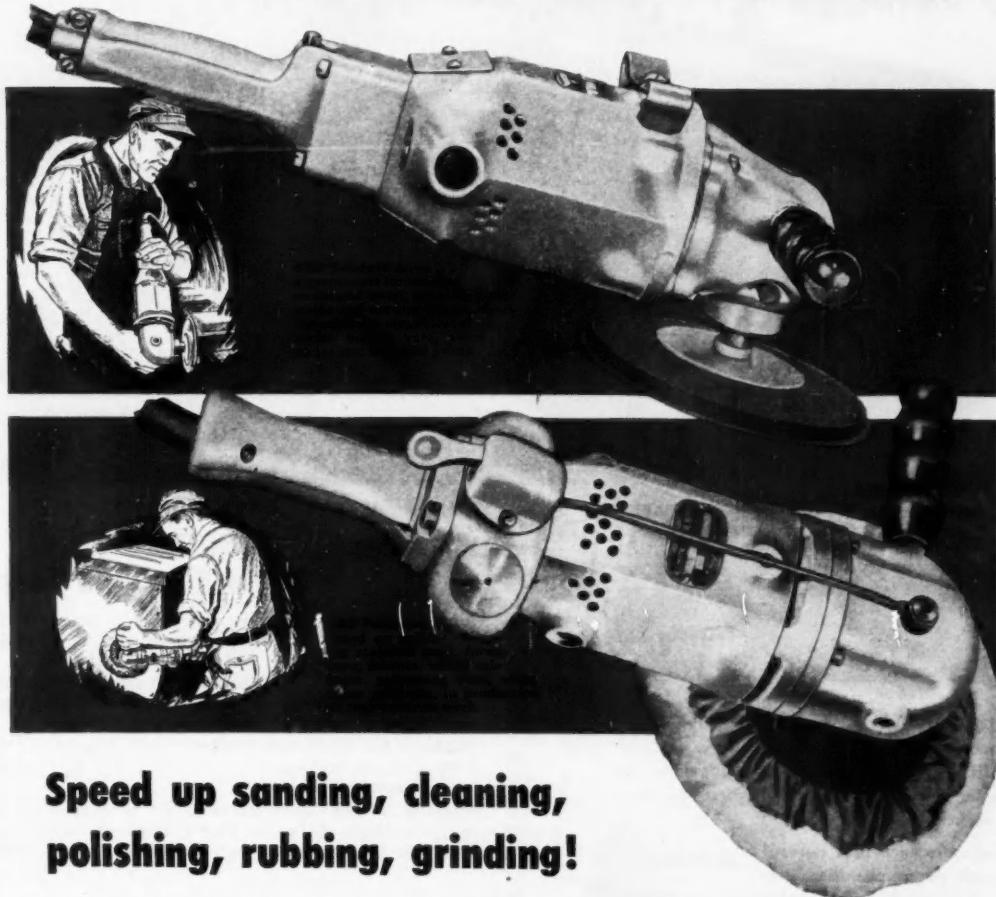
all those tested, Tinnerman SPEED NUTS made the biggest hit. Not only did SPEED NUTS end vibration loosening problems, they also provided an average time-savings of 48% per application over other methods.

Globe is justifiably proud of the jet target, one of the achievements that stands out in its 50th anniversary year. And Tinnerman is proud of its part in this success. Perhaps your company can use the valuable experience gained by Tinnerman on this and many other projects. Write for information on our comprehensive Fastening Analysis Service. TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. In Canada: Dominion Fasteners Limited, Hamilton. In Great Britain: Simmonds Aerocessories, Limited, Treforest, Wales.



Finishing Problem?

Black & Decker Sanders and Polishers have solved them for thousands of plants, shops!



**Speed up sanding, cleaning,
polishing, rubbing, grinding!**

BLACK & DECKER Sanders and Polishers speed up a raft of finishing jobs because they give you such B&D quality features as: (1) dependable B&D-built universal motors for abundant power; (2) match-lapped, spline-mounted spiral bevel gears for smooth, quiet flow of power; (3) perfect balance for easier handling. There are three B&D Sander models to choose from, in 7" and 9" disc diam., standard and heavy-duty types—two B&D Polisher models, 7" Standard and 7" Automatic, the latter equipped with exclusive automatic polish feed.

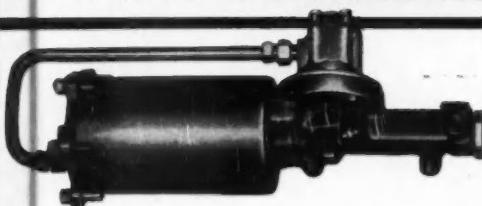
Whatever your problem, see your nearby B&D

Distributor first for expert help—and for eye-opening demonstrations of B&D Tools. Write for free catalog to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Avenue, Towson 4, Md.



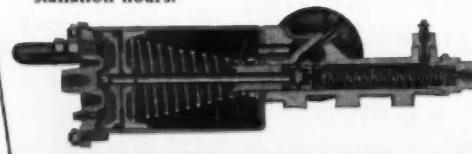
MIDLAND AIR HY-POWER

STANDARD on
Army Ordnance
Eager Beaver
6x6 Vehicles



Midland Air Hy-Power, compact and completely self contained, can be located as a single device at any available place on the chassis without moving the master cylinder, and using the original equipment brake pedal.

Is used to replace foot control valve and power chamber cluster—also supplied in complete truck or tractor air brake kits saving from 5 to 7 valuable installation hours.



Air Over Hydraulic in its Simplest Form

Midland Air Hy-Power is lightning fast, assuring greater efficiency, adds extra margin of safety and provides "passenger car" brake graduation and "pedal feel." Selected and now being installed on thousands of Ordinance 6x6 trucks as standard equipment, after long rigid tests by leading manufacturers.

Midland Air Hy-Power combines into one unit, three long used and thoroughly proven units, all sealed against atmospheric conditions.

Midland Air Hy-Power embodies the same principle of design as Midland Vacuum Hy-Power now in its 7th year. Call your Midland Distributor for literature and prices.

The
MIDLAND
STEEL PRODUCTS COMPANY
6660 Mt. Elliott Ave. • Detroit 11, Mich.

Export Department: 38 Pearl Street, New York, N. Y.

Detroit 11, Mich.

Export Department: 38 Pearl Street, New York, N. Y.



Air and Vacuum
POWER BRAKES

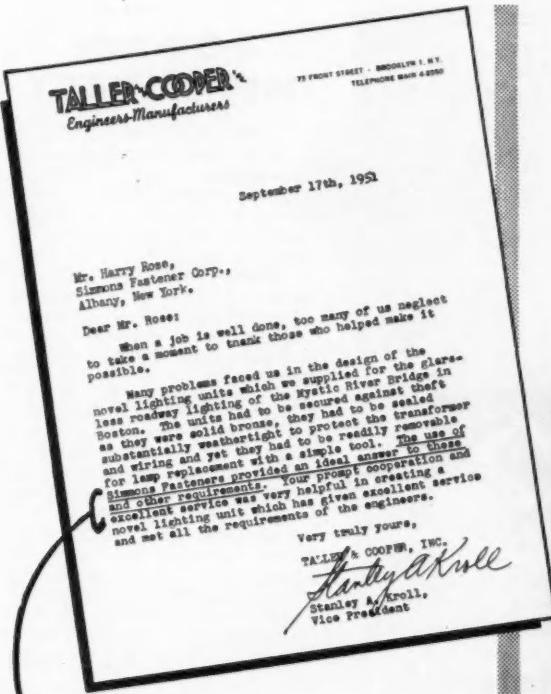


World's Largest Manufacturer of
AUTOMOBILE and TRUCK FRAMES



Air and
Electro-Pneumatic
DOOR CONTROLS





"The use of Simmons Fasteners provided an ideal answer"

Getting the right answer—engineering and production-wise—is the day-by-day business of Taller & Cooper, Inc. This engineering and manufacturing company has produced many unusual designs for power control, wind tunnels, computers, automatic weighing and toll-bridge structures. Taller & Cooper engineers, in developing the sealed-beam lighting for the Mystic River Bridge, Boston, Mass., found the right answer in Simmons QUICK-LOCK.

Have you a
similar fastening
problem?



Unusual design by Taller & Cooper solves a number of problems in highway lighting. The engineers use a conventional sealed-beam headlamp mounted in an adjustable bracket. A cast bronze cover plate with integral visor is attached with three Simmons QUICK-LOCK fasteners to the housing which is part of the bridge structure. A rubber gasket seals the assembly.

Servicing is simple because QUICK-LOCK opens or locks with a 90-deg. turn. Inspection is easy because the stud is self-ejecting when it isn't locked. QUICK-LOCK keeps the gasket compressed tightly. The special head makes the unit tamper-proof. The fastener also resists vibration.

QUICK-LOCK can provide your design with unusual plusses, too. Simmons' engineers will be glad to study your fastening problems.

SIMMONS FASTENER CORPORATION
1749 North Broadway, Albany 1, New York

Simmons

LINK-LOCK . . . QUICK-LOCK . . . SPRING-LOCK . . . ROTO-LOCK

FASTENERS WITH USES UNLIMITED

(Advertisement)

POWDER METALLURGY

CONSERVES MATERIALS

As the channeling of strategic metals into essential applications takes on increasing importance, the material-conserving advantages of powder metallurgy processes are receiving added attention.

In powder metallurgy, parts are die-formed to their final dimensions within extremely close tolerances. This does away with the need for machining operations which result in scrap metal.

INTRICATE SHAPES

The advantages of the powder metallurgy process are of particular importance in the production of intricate structural shapes, which would normally involve extensive and complex machining, with a large amount of scrap. Gears, cams and many other parts are successfully produced, without machining, by the powder metallurgy process.

In addition to making most effective use of critical materials, the



Strategic Materials S-T-R-E-T-C-H Farther in "COMPO" and "POWDIRON"

BEARINGS AND PARTS

When hard-to-get metals are processed by Bound Brook powder metallurgy to form "COMPO" (porous bronze) and "POWDIRON" (sintered iron) bearings and parts, there's no waste of strategic materials. The metals go farther, to serve Bound Brook customers better — and to aid the defense program.

"COMPO" and "POWDIRON" bearings and parts need no machining, leave no scrap — at Bound Brook or on the user's assembly line.

For latest list of stock sizes of "COMPO" bearings, write us on your company letterhead. Consult our Engineering Department on parts and special bearings.

SEND FOR THIS FREE BOOKLET TODAY

BOUND BROOK

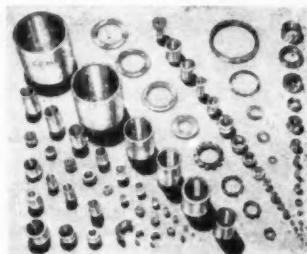
OIL-LESS BEARING COMPANY

BOUND BROOK, N. J. • BOUND BROOK, N. H.

ESTABLISHED 1883



"COMPO"
•
"POWDIRON"
•
"BOUND BROOK"
•



Parts such as these can be produced by the powder metallurgy process, without machining operations that result in metal scrap and increased unit costs.

powder metallurgy process, by eliminating costly machining, reduces unit cost to the purchaser. Since the production of special shapes requires tooling, the low-cost advantage is most marked in high-volume work, where initial tooling charges are offset by subsequent savings in unit costs.

COMPOSITIONS AVAILABLE

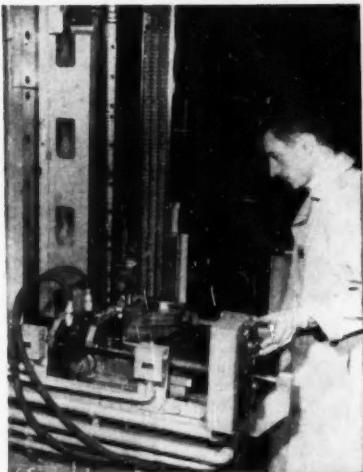
Bearings and parts can be produced in any one of a number of compositions of "COMPO" (porous bronze) or "POWDIRON" (sintered iron) either with or without self-lubrication. Detailed information may be obtained from the manufacturer, Bound Brook Oil-Less Bearing Company, Bound Brook, N. J.

this
pad

and this
radius



broached in a single pass ... the AMERICAN way



Combining two operations on an American SB 48-15 Single Ram Vertical Hydraulic Surface Broaching Machine enabled this automotive engine manufacturer to broach the radius and pad (which are non-adjacent) of the front engine cover in one pass.

The tooling for this operation consists of generating type broaches and shaving blades mounted on the main machine slide for broaching the radius and joint surfaces. In addition, a special hardened and ground guide is mounted on the table to guide generating type broaches and shaving blades which are pulled down by adapting the lower end of the holder to the machine slide. These broach the pad thus completing the two operations in one pass.

Automatic clamping, plus an automatic sliding table are two additional features of this American installation that help maintain a production rate of approximately 115 parts per hour at 85% efficiency.



Write for your copy of
American's Circular 300.

YOU CAN SOLVE YOUR BROACHING PROBLEMS THE AMERICAN WAY

This is only one of thousands of problems solved during American's 25 years of experience in the manufacture of broaching machines, broaches, and broaching fixtures. A part-print or sample and hourly requirements are all it takes to start American engineers working on your problem. Write today!



American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery





Look into this mirror for faster production

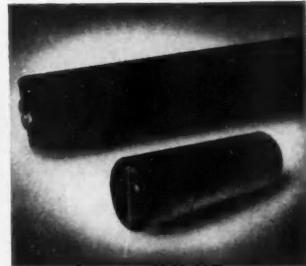
A brushing method used by a mirror manufacturer . . . or one similar to this . . . may help you improve product quality and cut rejects.

To provide a binder for the silvering compound, a base coat was formerly applied to the glass by hand. But uneven coating caused blemishes in the silver after drying. With the help of the Osborn Brushing Analyst, a power brushing method with specially-engineered Osborn Heli-Master[®] Brushes was developed (1) to clean the glass thoroughly with water and (2) to brush on the base coat in a perfectly uniform film. Results: Blemishes in silvering practically eliminated. Mirror production has been stepped up and rejects cut to the bone.

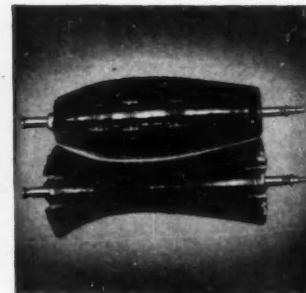
Look into the possibilities of power brushing for the improving of your manufacturing . . . whether it involves glass, metal, rubber, plastics or textiles. To get the help of an OBA, call or write *The Osborn Manufacturing Company, Dept. 586, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



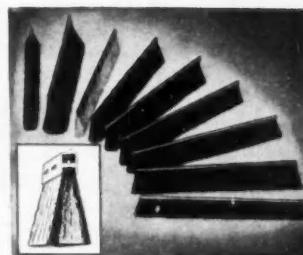
LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR
QUALITY WORKMANSHIP AND MATERIALS



FOR HIGH SPEEDS. Osborn Heli-Master[®] "FA" Brushes provide a continuous, uniform density of fill up to a 180° brush face length. These can be built for many types of cleaning, scrubbing and finishing for smooth operation at speeds up to and exceeding 10,000 surface feet per minute. In wide range of fill materials for metallic and non-metallic materials.

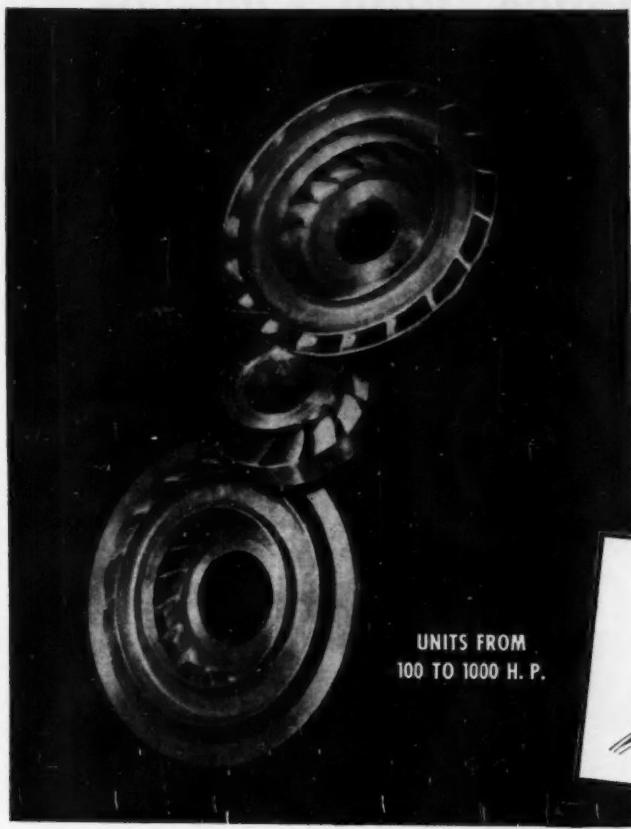


FOR FLEXIBILITY. Osborn Rota-Master[®] Brushes may be used for wide-face applications such as glass washing, cleaning and unloading conveyor belts, wood staining, bus washing, rubber roughing, power sweepers. Open face design affords flexibility. Density is regulated by the number of Master strips employed.



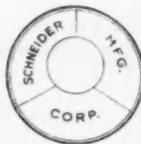
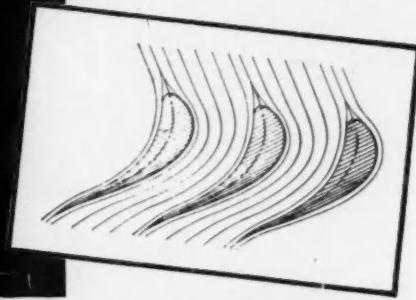
FOR MANY JOBS . . . Osborn Master Strip Brushes can be used in special mountings for a wide variety of power-driven applications—in straight strips or wound on an arbor as for the Heli-Master or Rota-Master Brushes. Have the Osborn Brushing Analyst show you how these versatile brushes can help solve your problems.

*Trademark



DISTINGUISHED
FOR SIMPLICITY
AND GREATER
EFFICIENCY

UNITS FROM
100 TO 1000 H. P.



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HYDRAULIC TORQUE CONVERTER

Companies licensed under the Schneider System include:

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The White Motor Co., Cleveland, O.
Clark Equipment Co., Buchanan, Mich.
Torcon Corp., Chagrin Falls, O.
Western Gear Works, Seattle, Wash.
R. G. LeTourneau, Inc., Peoria, Ill.

Pioneers of torque converters in America, Schneider today is producing dependable hydraulic torque converters that are characterized by their simplicity and economy. These units are used in busses, trucks, tractors, and industrial application.

SCHNEIDER MANUFACTURING CORP.

Pioneers of Torque Converters in America

315 North Franklin Street, — Muncie, Indiana

Repeat performance...with a new twist!

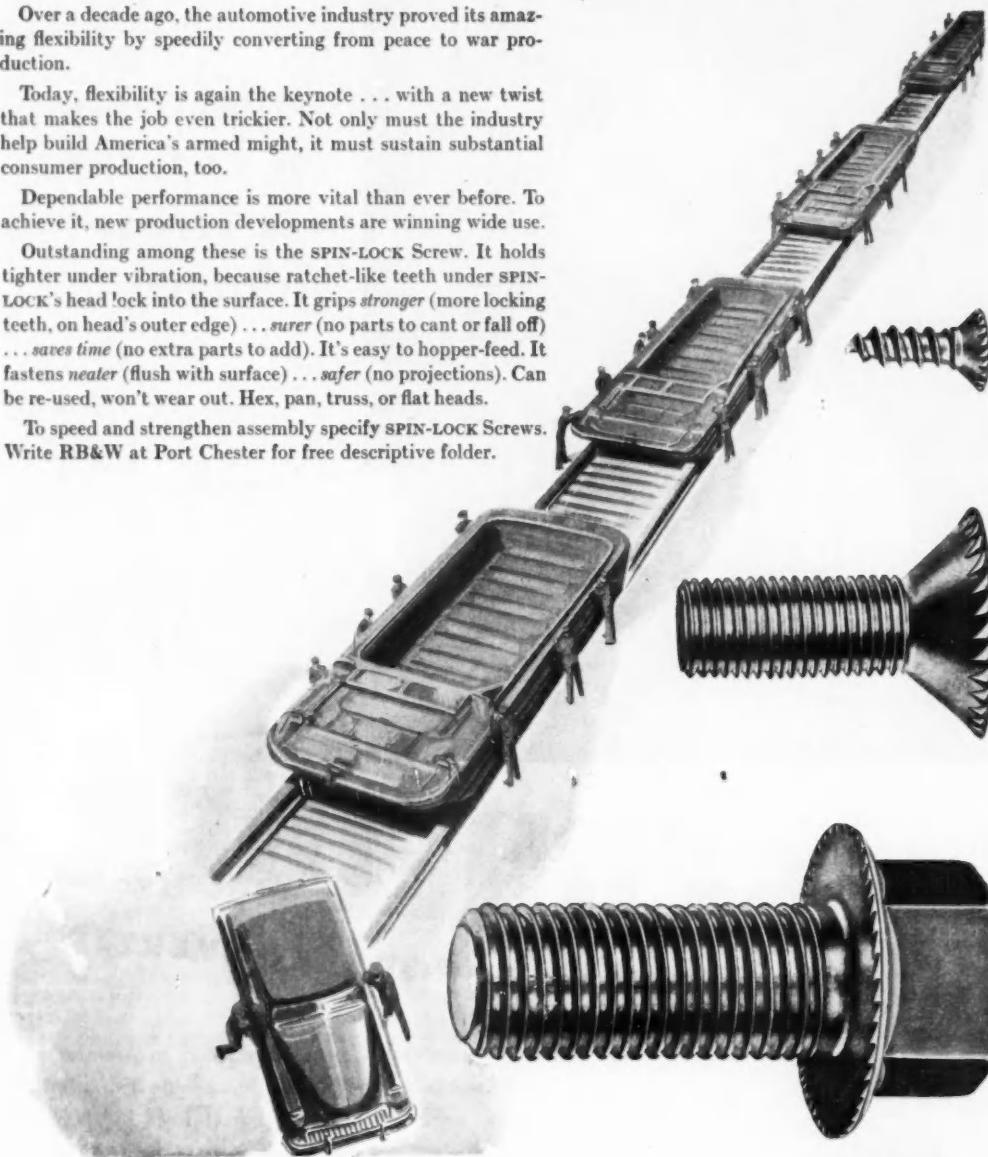
Over a decade ago, the automotive industry proved its amazing flexibility by speedily converting from peace to war production.

Today, flexibility is again the keynote . . . with a new twist that makes the job even trickier. Not only must the industry help build America's armed might, it must sustain substantial consumer production, too.

Dependable performance is more vital than ever before. To achieve it, new production developments are winning wide use.

Outstanding among these is the SPIN-LOCK Screw. It holds tighter under vibration, because ratchet-like teeth under SPIN-LOCK's head lock into the surface. It grips *stronger* (more locking teeth, on head's outer edge) . . . *surer* (no parts to cant or fall off) . . . *saves time* (no extra parts to add). It's easy to hopper-feed. It fastens *neater* (flush with surface) . . . *safer* (no projections). Can be re-used, won't wear out. Hex, pan, truss, or flat heads.

To speed and strengthen assembly specify SPIN-LOCK Screws. Write RB&W at Port Chester for free descriptive folder.



RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Dallas, Oakland. Sales agents at: Portland, Seattle.

106 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG





EATON

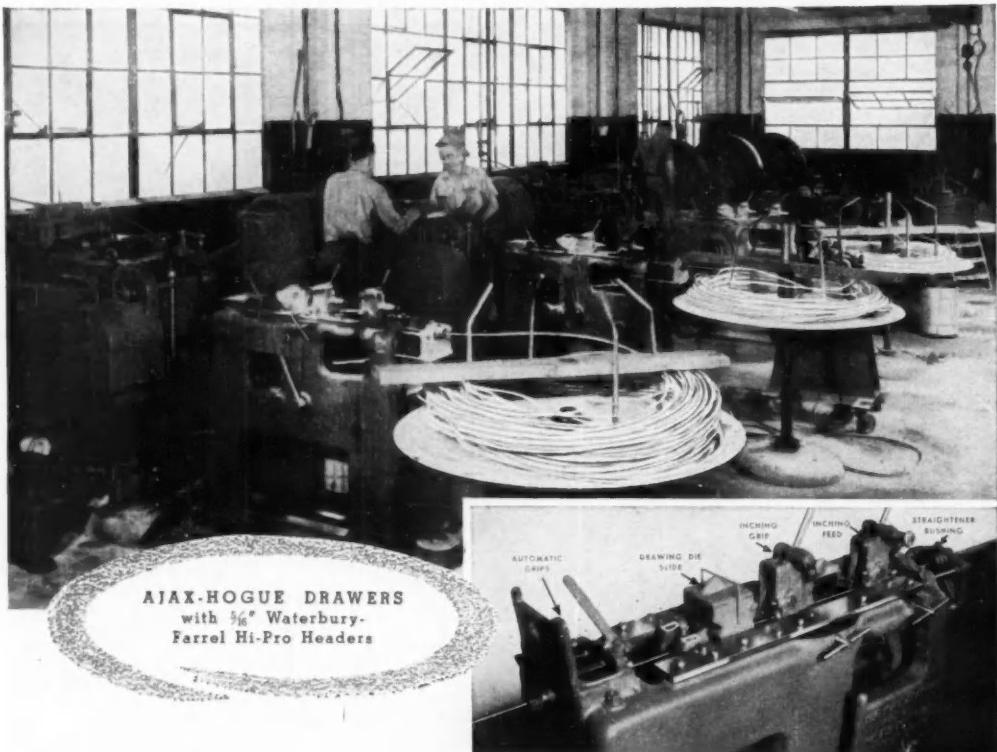
Fresh-Air Heating, Ventilating, and
De-Frosting Systems Achieve a New High in
Motor Car and Truck-Cab Comfort,
Safety, and Driver Health



Manufactured in the country's largest, most modern plant devoted
exclusively to automobile heater production. Engineered for,
and sold exclusively to car and truck manufacturers.

EATON MANUFACTURING COMPANY
Heater Division
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EATON PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR
PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRINGTIES
SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMIC DRIVES, BRAKES, DYNAMOMETERS



High Production Heading with AJAX-HOGUE Drawn Wire

Progressive bolt manufacturers throughout the country are achieving greater efficiency and lower production cost with Ajax-Hogue wire drawers coupled to their headers.

Hogue drawn clean, straight, accurate to size wire eliminates almost all of the avoidable down time, saves much of the wear on the header dies, makes it easily possible to change the wire size to meet requirements. It also effects a saving in the cost by using hot rolled rod instead of more expensive mill drawn wire.

If you operate any headers, regardless of make, which are not equipped with Ajax-Hogue wire drawers write for Bulletin No. 111 in order to learn more about the advantages of these drawers.

THE **Ajax**

MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
110 S. DEARBORN ST.
CHICAGO 3, ILLINOIS

DEWART BUILDING
NEW LONDON, CONN.

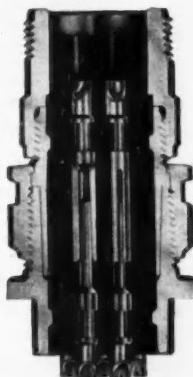
HIGHER EFFICIENCY WITH BENDIX SCINFLEX ELECTRICAL CONNECTORS MINIMUM VOLTAGE DROP

PLUS

- **Moisture proof**
- **Pressure Tight**
- **Radio Quiet**
- **Single-piece Inserts**
- **Vibration proof**
- **Light Weight**
- **High Insulation Resistance**
- **Easy Assembly and Disassembly**
- **Fewer Parts than any other Connector**
- **No additional solder required**

The ability to carry maximum currents with only a minimum voltage drop is an outstanding characteristic of Bendix Scinflex Electrical Connectors. This important feature is only a part of the story of Bendix success in the electrical connector field. The use of Scinflex dielectric material, an exclusive Bendix development of outstanding stability, increases resistance to flash over and creepage. In temperature extremes, from -67°F. to +275°F. performance is remarkable. Dielectric strength is never less than 300 volts per mil. All in all, no other electrical connector combines as many important exclusive features as you will find in Bendix Scinflex connectors. For higher efficiency in your electrical connectors be sure to specify Bendix Scinflex. Our sales department will gladly furnish additional information on request.

PLUS



SHELL

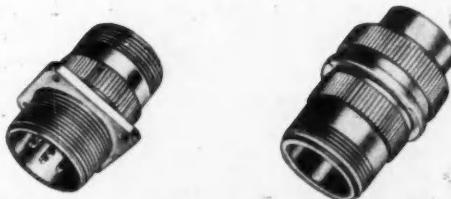
High strength aluminum alloy . . . High resistance to corrosion . . . with surface finish.

CONTACTS

High current capacity . . . Low voltage drop.

SCINFLEX ONE-PIECE INSERT

High dielectric strength . . . High insulation resistance.



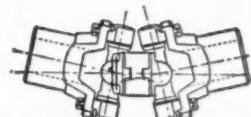
Bendix

BENDIX CORPORATION, 197 S. Flower Street, Los Angeles, California • 200 Madison Avenue, New York 16, New York • 1000 University Avenue, Seattle, Washington • 1000 University Avenue, San Francisco 3, California

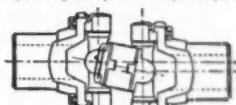
**if
limited
SPACE
is
your
problem**



MECHANICS close-coupled type Roller Bearing UNIVERSAL JOINTS are specially designed for operation within cramped quarters, and where shafts are out of alignment — as in rear engine cars, trucks and busses. Let our engineers show you how these MECHANICS joints will conserve space and compensate for offset shafts, in your new models. These joints fit into spaces that engineers formerly considered too short for universal joints.



High Angularity in Cramped Space



Compensates for Out of Alignment

MECHANICS *Roller Bearing* UNIVERSAL JOINTS

For Cars, Trucks, Tractors, Farm Implements,
Road Machinery, Industrial Equipment, Aircraft

Let our engineers show you how MECHANICS close-coupled Roller Bearing UNIVERSAL JOINTS will conserve space and compensate for offset shafts, in your new and improved models.

**MECHANICS
UNIVERSAL JOINT
DIVISION**

Borg-Warner

2024 Harrison Ave., Rockford, Ill.

AUTOMOTIVE INDUSTRIES, December 15, 1951

Again the time has come **1943**
to ask your company,
and every company, to

Get in the **1951 **SCRAP****

FOR every ton of ingot steel produced, at least a half-ton of iron and steel scrap must have previously reached the furnaces. Steel is currently being produced at full capacity, more than 100 million ingot tons annually—and there is a developing scrap shortage of serious proportions. Just as in the early years of World War II, the steel industry asks the help of all industry to relieve the situation.

TWO IMPORTANT THINGS TO DO

1 CLEAN OUT YOUR PLANT SCRAP.

This is a job that every company can do. Old, worn-out or out-moded and replaced machinery and equipment, rails, structural parts,

etc. constitute the "heavy melting scrap" which the steel industry needs most. Clean up your plant and yards—move out this heavy scrap into the channels of use.

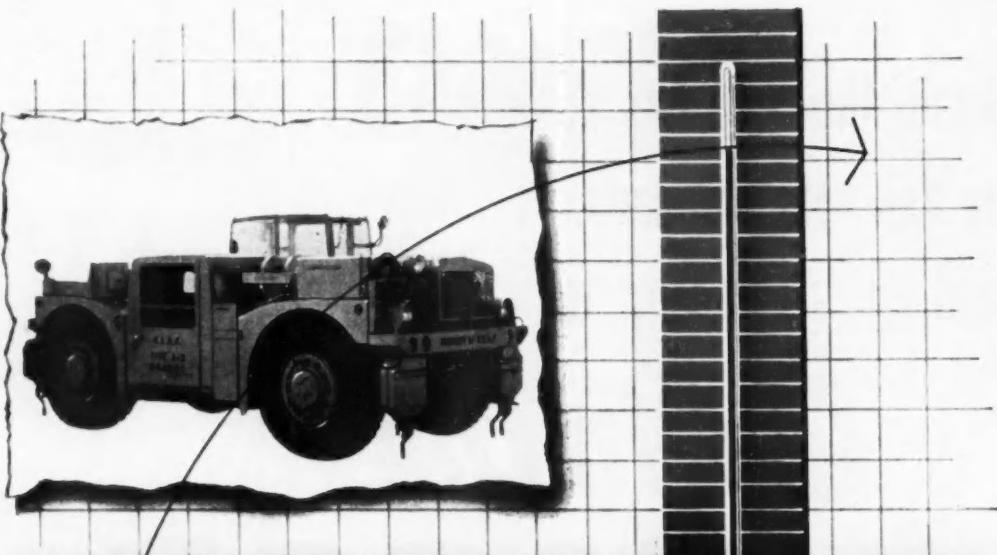
2 HURRY BACK YOUR WORKING SCRAP. Don't let the waste of metal-working—turnings, borings, punchings, crop ends, etc.—lie around the plant a day longer than necessary. Keep it moving, back to the furnaces. And doubly important, be sure to classify and segregate your alloy steel scrap. Thus handled, it not only commands a higher price, but will help to conserve the nation's supply of critical alloys, practically all of which are highly essential.

Contributed in the National Interest by

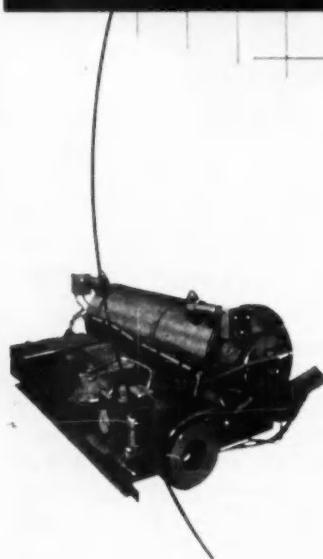
ALLEGHENY LUDLUM STEEL CORPORATION

Henry W. Oliver Building • Pittsburgh 22, Penna.

W&O CL 2017



QUICK SURE STARTS AT 65° BELOW!



Talk about tough heating problems! This unique diesel-powered tow-tug—built by Euclid Road Machinery Company to tow bombers for the Air Force—must be equipped to get started and stay running even in sub-sub-freezing temperatures. Recent tests under severest conditions proved conclusively that the new military Janitrol booster heater insured positive starting without special fuel capsules—at minus 65°F after a 72-hour "cold-soak." The heater consistently raised engine temperature from -65°F to the 155° to 165°F range well within 60 minutes and kept it there, insuring proper operating temperature, preventing sludge formation and other troubles that occur when diesels run too cool for proper combustion. No wonder Janitrol heaters made good on this assignment. They've been service-proven for years by transit companies running diesel coaches all over the map. They promise other important applications wherever diesel or gasoline engines are used in stationary or mobile power plants or transportation equipment. Your Janitrol representative is ready to help.

HEAT WHEREVER YOU WANT IT



Janitrol

AIRCRAFT-AUTOMOTIVE DIVISION SURFACE COMBUSTION CORP., TOLEDO 1, OHIO

F. W. Scott, New York, New York; 225 Broadway, and Bethesda, Maryland, 4650 East West Highway; C. B. Anderson, Kansas City, Missouri, 2201 Grand Avenue; Lee Curtin, Hollywood, California, 7046 Hollywood Boulevard; Frank Deak, P. A. Miller, Central District Office, Engineering Development and Production, Columbus, Ohio; Headquarters, Toledo, Ohio

ALL HOLES PIERCED IN ONE OPERATION

at A. O. Smith in Milwaukee

Piercing and trimming this automotive frame side bar formerly required a costly sequence of separate setups and repeated handling of the piece. Now, all operations are performed simultaneously and material handling is completely automatic.

DANLY

HYDRAULIC METALWORKING EQUIPMENT

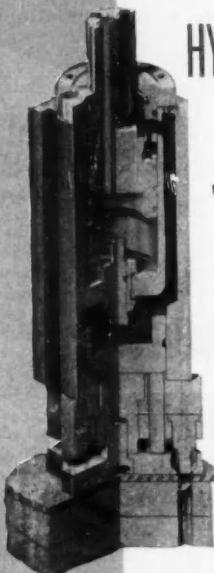
with automatic stripping action

Cost saving solutions to metalworking problems like this typify the results you can expect with Danly Hydraulic Metalworking

Equipment . . . designed and built to your specifications.

Compact power cylinders like the one shown here, with capacities ranging up to 200 tons, are applied singly or in any necessary combination to help you save man hours, increase output and reduce costs. Write today for complete information . . .

Danly engineers are at your service for detailed discussion of your application.



Cutaway view of a Danly Hydraulic Power Cylinder. At A. O. Smith, 16 of these units are arranged to operate simultaneously performing the multiple piercing and trimming operations described above . . . each unit complete with automatic hydraulic stripping action. Extra long precision guides permit several punches to be mounted in each unit.



PIERCING



EXTRUDING



TRIMMING



NOTCHING

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● Even after you've tried them all, give us a call and we'll show you what spring service really is. From planning to production, U. S. Steel Wire Spring's skilled craftsmen are ready to put their broad knowledge of spring engineering to work for you. Let us demonstrate our ability to turn out your springs and small parts quickly — accurately.

Producing Clutch Pressure Springs
... Clutch Dampener Plate Springs

The **U. S. STEEL WIRE SPRING Co.**

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in the private offices and in all corners of automotive and aviation industrial manufacturing plants, influence the buying of materials, tools, machinery and equipment.

In addition to the buyers whom your own salesmen contact,

AUTOMOTIVE INDUSTRIES

reaches men whose names you'll never know — but whose recommendations may mean millions to you.

Also Automotive Industries helps to create and maintain the good reputation of your product in quarters where that help will do the most good.

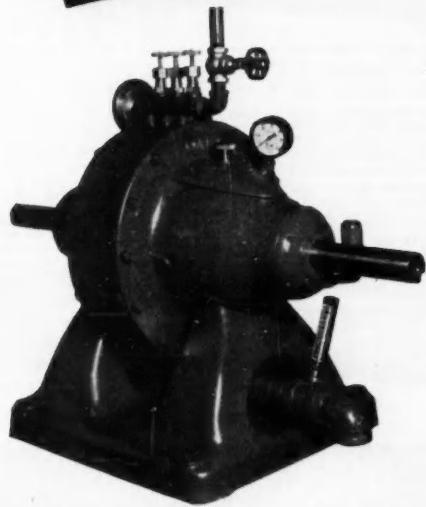
Automotive Industries



A Chilton Publication

Chestnut & 56th Sts. Philadelphia 39, Pa.

HI-EFF TAYLOR
HYDRAULIC
DYNAMOMETERS



EFFICIENT — ECONOMICAL — COMPACT

Investigate today! Taylor HI-EFF now offers a uni-directional force measurement device, if remote station reading is desired. In addition, remote control can be employed in most applications.

All frictional and torque losses, except of cradle bearings, are measured. Consequently a high degree of accuracy (approx. 99.7%) is maintained. Compared on a H.P. and R.P.M. capacity basis, and considering the low initial cost, minimum maintenance expense and small floor space required, you can have HI-EFF accuracy at cost savings that will surprise you. HI-EFF offers the most economical maintenance and investment cost per hour.

Taylor HI-EFF Hydraulic Dynamometers are available in 72 different capacity models — Capacities range from fractional to 10,000 H.P. Speeds from 0 to 25,000 R.P.M. Reversible if desired.

Taylor engineers will be glad to make recommendations to suit your specific problems. Write for Bulletin No. 760.

**TAYLOR DYNAMOMETER
AND MACHINE COMPANY**

528 A West Highland Avenue, Milwaukee 3, Wisconsin

Manufacturers of HI-EFF Hydraulic Dynamometers — Static Balancing Machines — Sensitive Drilling Machines.

MARKE^M[®]

made to make your
MARK



MARKE^M helps make
their names famous

Under these trade marks are made products ranging from nylons to aircraft. They include garments, hosiery, knit goods and textiles, radio and TV tubes, capacitors and resistors, vulcanizing equipment, cameras, pharmaceuticals, hand grenades, cartridges and canvas goods. All over the world, MarkeM methods, machines, type and inks are marking the products of industry.

There is a MarkeM method for almost every identification purpose. MarkeM Equipment is used for Marking on Products, Packages, Parts, or for producing Labels.

Submit your problem in detail with a sample of the item to be marked. MarkeM Machine Company, Keene 8, N. H.

MARKE^M
BETTER MARKING SINCE 1911

New Miracle Material **SILICONE RUBBER**



Whether the problem is new product design or the improvement of present design, consider silicone, the amazing new rubber that performs to best advantage where ordinary rubbers fail.

For the answer to any silicone rubber problem, call Arrowhead—specialists in the development and manufacture of silicone rubber products of all kinds.

ARROWHEAD
RUBBER COMPANY

MONTEBELLO, SAN ANTONIO, CALIF.

A DIVISION OF NATIONAL MOTOR BEARING CO., INC.

ARCOSIL[®] SILICONE RUBBER PRODUCTS

"O" Rings
Molded
Extruded
Die-cut
Tubing
Ducting
Couplings
Fiberglass Reinforced



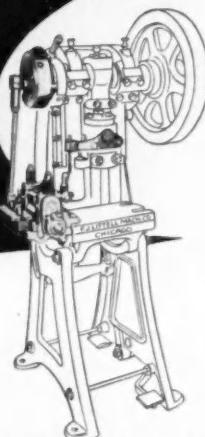
WRITE FOR ENGINEERING BULLETIN

Gives latest complete data on characteristics and applications of various silicone rubber compounds.

FOR LOW COST
AND BIG RESULTS

Feed Your Presses With

LITTELL STYLE "M" AUTOMATIC ROLL FEED



FOR SPEED . . . With Style "M" automatic feeding your press can easily produce 9,000 stampings an hour at 200 strokes per minute, or 4,600 stampings an hour at 100 strokes per minute.

FOR VERSATILITY . . . Style "M" feeds left to right, right to left and front to back. Presses up to 100 tons capacity can be equipped with reversing clutch. Feed lengths per stroke are 0 to 4½" with standard gears or 0 to 8½" with compound gears.

FOR ADAPTABILITY . . . Style "M" is adaptable to any standard punch press. It feeds coil stock up to 8" wide and up to .035" thick (17 gauge).

FOR SAFETY . . . Style "M" automatic feeding keeps hands and fingers away from danger, prevents costly accidents.

WRITE FOR CATALOG

F. J.
LITTELL
MACHINE CO.

ROLL FEEDS • RIBAL FEEDS • STRAIGHTENING
MACHINES • REELS • AIR BLAST VALVE

4107 N. RAVENSWOOD AVE. • CHICAGO 13, ILL.

FOR DURABILITY . . . Style "M" is built with hardened and ground feeding rolls and the other quality features that have made Littell Roll Feeds accurate and durable since 1918.

FOR ECONOMY . . . Style "M" brings you a big saving in price. It gives your presses the lowest insurance rate. It cuts your cost per stamping by multiplying press output.

District Offices: Detroit, Cleveland

Quantity PRODUCTION of GREY IRON CASTINGS

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1866

THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

Chilton
**AUTOMOTIVE INDUSTRIAL
LIST**

Your KEY TO

33,000 Executives in
4,567 automotive plants

Here's the only personalized, authentic list of 33,000 automotive engineering, production, administrative, sales and purchasing executives . . . your key to more effective direct mail advertising. Corrected daily, the Chilton List covers 4,567 plants making cars, trucks, buses, engines, aircraft, parts, farm and road equipment. Selective addressing can be made—by type of executive and industry. For more data, write:

DIRECT MAIL DIVISION

CHILTON COMPANY
Chestnut and 56th Sts., Philadelphia 39, Pa.

AUTOMOTIVE HEADQUARTERS

CLEVELAND tapping machines

300 PIECES PER HOUR

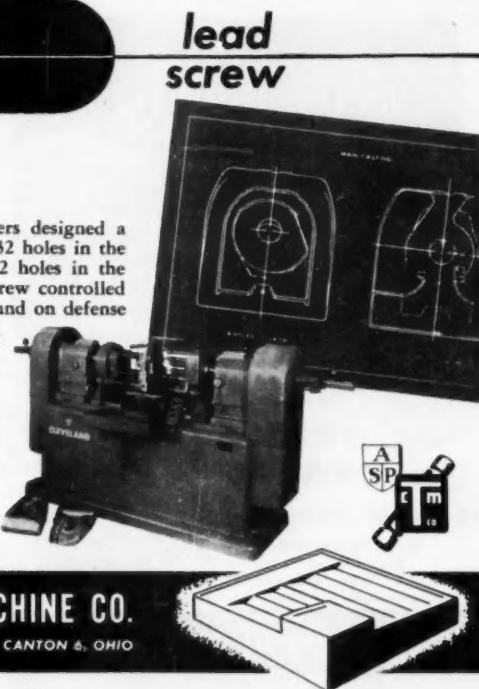
BOTH SIDES TAPPED IN ONE OPERATION

For a leading appliance manufacturer Cleveland engineers designed a Cleveland Tapping Machine to tap four 10-24 and one 6-32 holes in the top face of the main casting and five 10-24 and two 8-32 holes in the bottom face... both sides simultaneously all with lead screw controlled spindles to assure complete accuracy. On needed civilian and on defense jobs Cleveland Tappers are reducing production costs and saving priceless man hours. With a Cleveland Tapper engineered to the job, a semi-skilled worker becomes a skilled operator.



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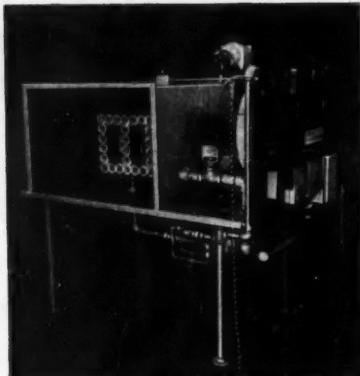
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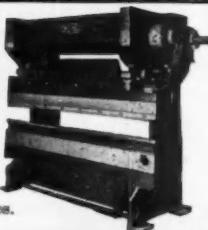
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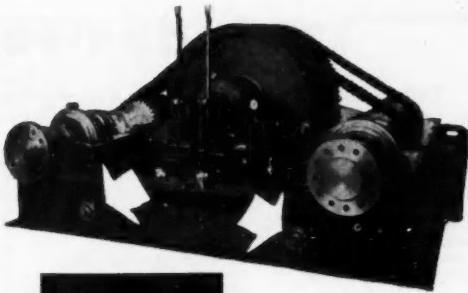
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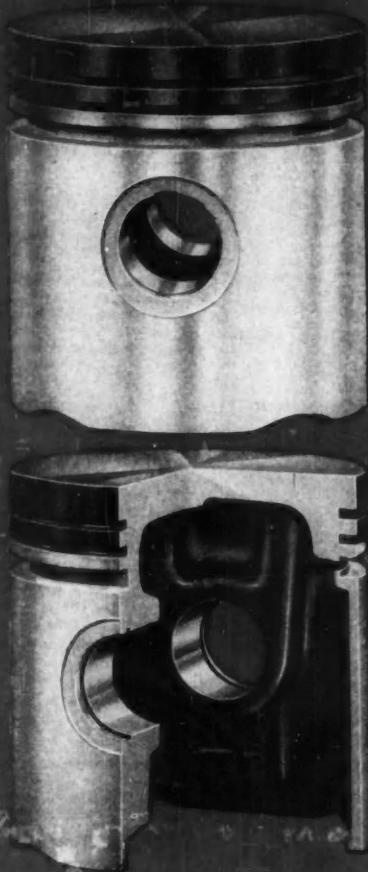
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